Neck mass

Omar Alsaraireh, MD .

Otolaryngology , Head and Neck Oncology and Microvascular Reconstructive Surgeon

King Husain Cancer Center , Consultant ,head of department .

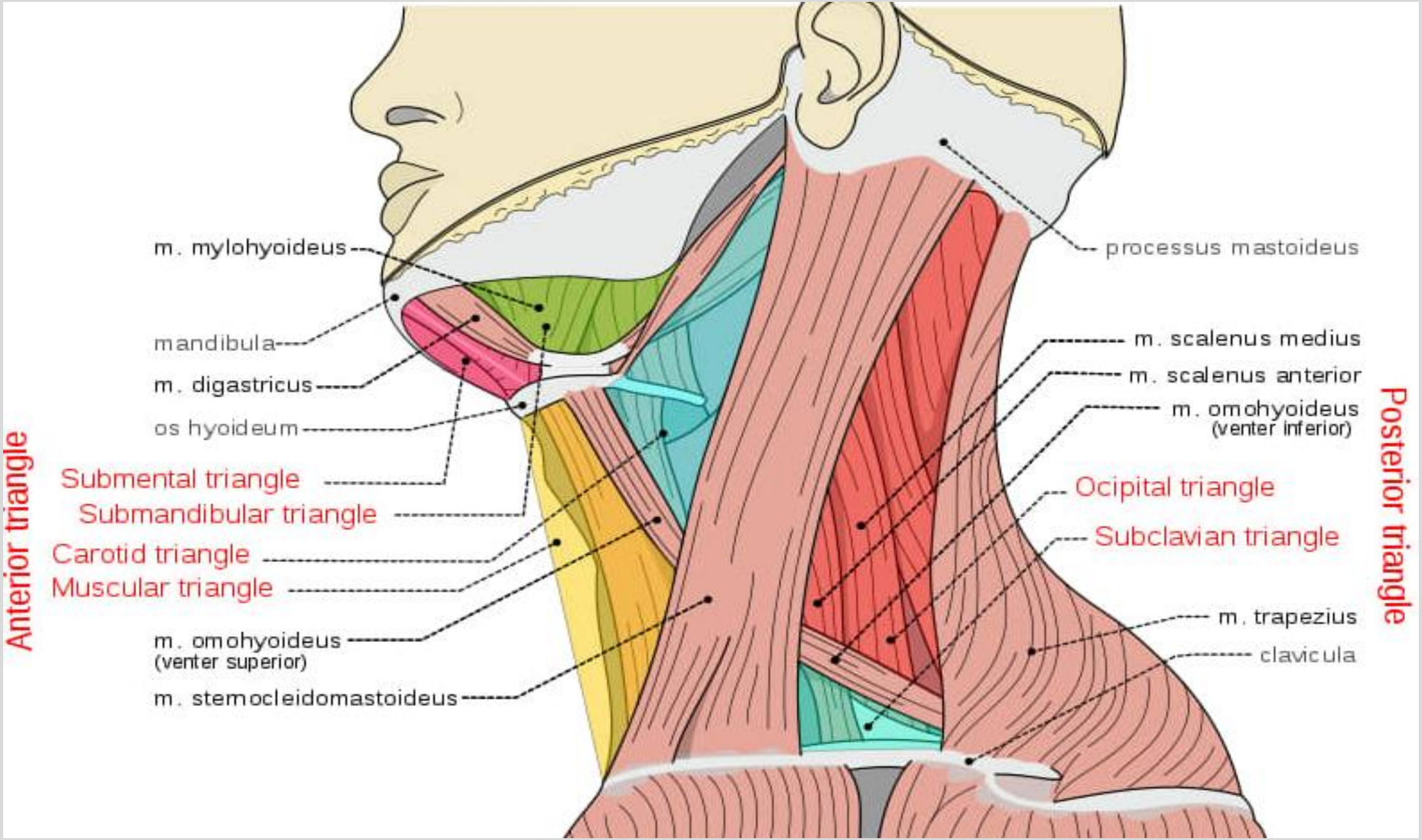
Jordan Uinversity Hospital , Consultant .

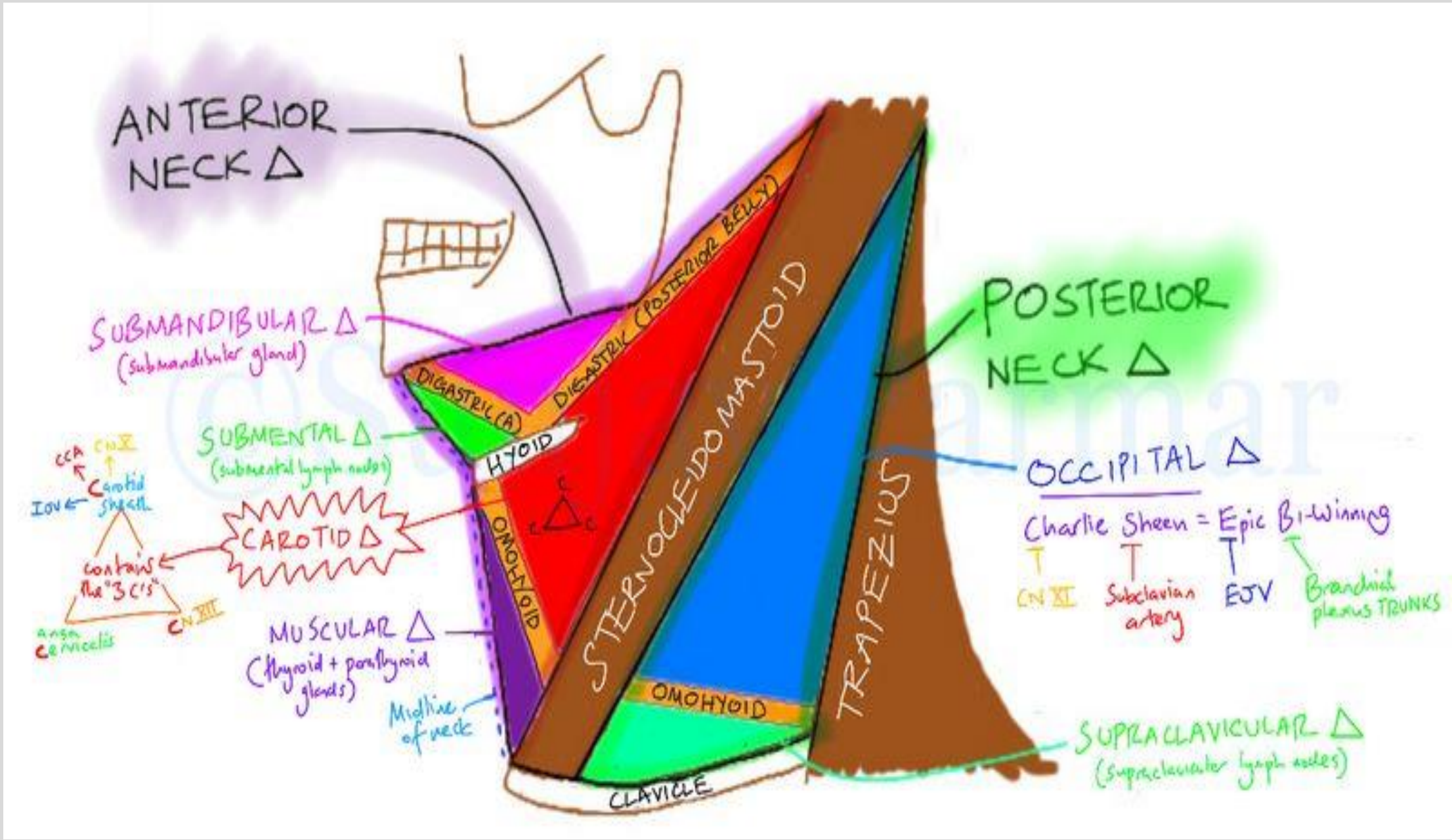
Introduction

- A mass in the neck is a common clinical finding that presents in patients of all age groups
- The over all prevalence range between 10-15 % with incidence tend to increase with age
- The “rule of 80” is often applied, which states that 80% of non-thyroid neck masses in adults are neoplastic and that 80% of these masses are malignant. A neck mass in a child, on the other hand, has a 90% probability of being benign
- The differential diagnosis may be extremely broad, and although most masses are due to benign processes, malignant disease must not be overlooked

Introduction

- A careful medical history should be obtained, and a thorough physical examination should be performed.
- The patient’s age and the location, size, and duration of the mass are important pieces of information.
- Congenital ,Inflammatory and neoplastic are the spectral causes of neck masses in different age group .
- Fine-needle aspiration and biopsy ,ultrasound and contrast-enhanced computed tomographic scanning are the best techniques for evaluating these masses.
- An otolaryngology consultation for endoscopy and possible biopsy should be obtained when a neck mass persists beyond four to six weeks after a single course of a broad-spectrum antibiotic


Anterior triangle
Posterior triangle
m. mylohyoideus
mandibula
m. digastricus
os hyoideum
Submental triangle
Submandibular triangle
Carotid triangle
Muscular triangle
m. omohyoideus
(venter superior)
m. sternocleidomastoideus
processus mastoideus
m. scalenus medius
m. scalenus anterior
m. omohyoideus
(venter inferior)
Ocipital triangle
Subclavian triangle
m. trapezius
clavicula


ANTERIOR NECK Δ
SUBMANDIBULAR Δ
(submandibular gland)
SUBMENTAL Δ
(submental lymph nodes)
CAROTID Δ
CCA
CN X
Carotid sheath
IJV
contains the "3 C's"
CN XII
ansa cervicalis
MUSCULAR Δ
(thyroid + parathyroid glands)
Midline of neck
DIGASTRIC (A)
DIGASTRIC (POSTERIOR BELLY)
HYOID
OMOHYOID
STERNOCLEIDOMASTOID
OMOHYOID
CLAVICLE
TRAPEZIUS
POSTERIOR NECK Δ
OCCIPITAL Δ
Charlie Sheen = Epic Bi-Winning
CN XI
Subclavian artery
EJV
Brachial plexus TRUNKS
SUPRACLAVICULAR Δ
(supraclavicular lymph nodes)

EMBRYOLOGY

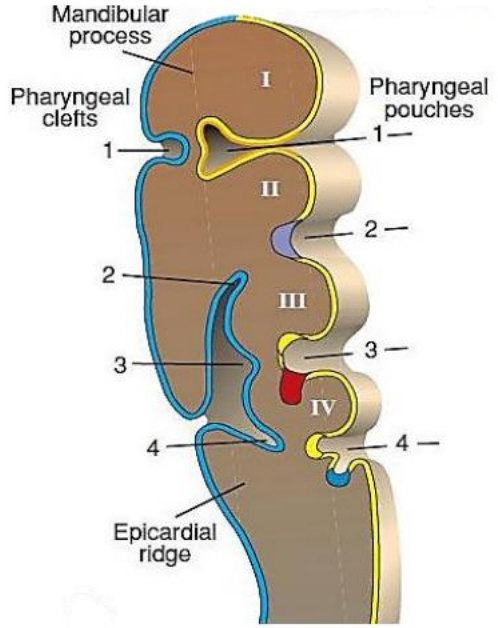
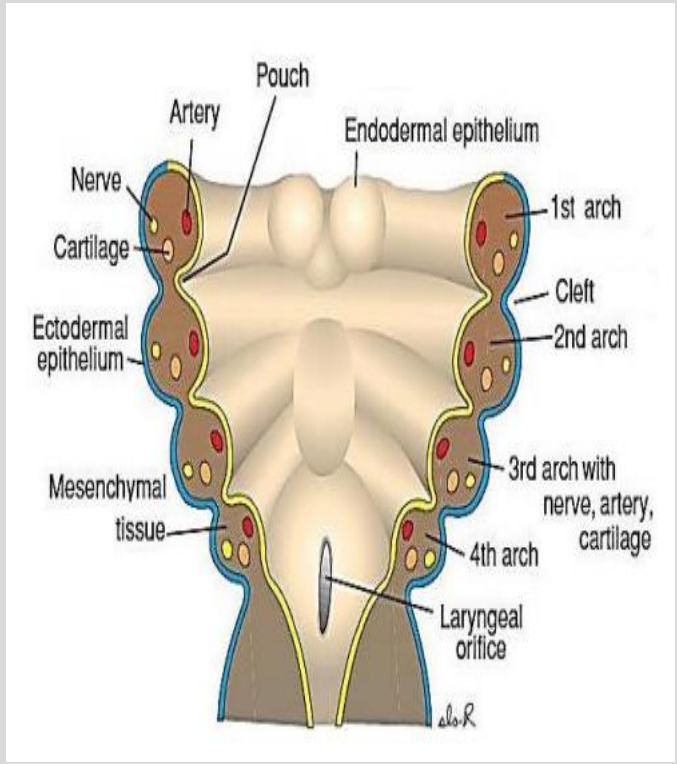


Figure 3: Branchial arches, clefts and pouches; clefts 2-4 form the Sinus of His



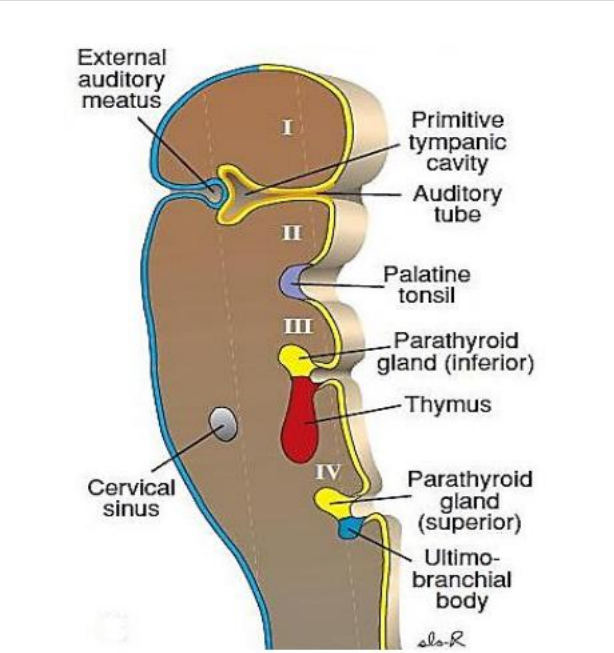


Figure 4: Structures that evolve from branchial clefts and pouches; clefts 2-4 form cervical sinus that is subsequently obliterated https://missinglink.ucsf.edu/restricted

EMBRYOLOGY

	Bone/Cartilage	Nerve	Artery
I	Incus, malleus, mandible	V2, V3	Maxillary Ext carotid
II	Stapes, styloid, hyoid (lesser cornu/upper body)	VII	Stapedial Hyoid
III	Hyoid (greater cornu/ inferior body	IX	Common carotid Internal carotid
IV	Thyroid & epiglottic cartilages	Vagus Superior laryngeal	Right: aortic arch, subclavian Left: aortic arch
VI	Cricoid cartilage, Arytenoid cartilages, Corniculate cartilage	Vagus Recurrent laryngeal	Right: Pulmonary Left: Pulmonary, ductus arteriosus

Table 1: Derivatives of arches

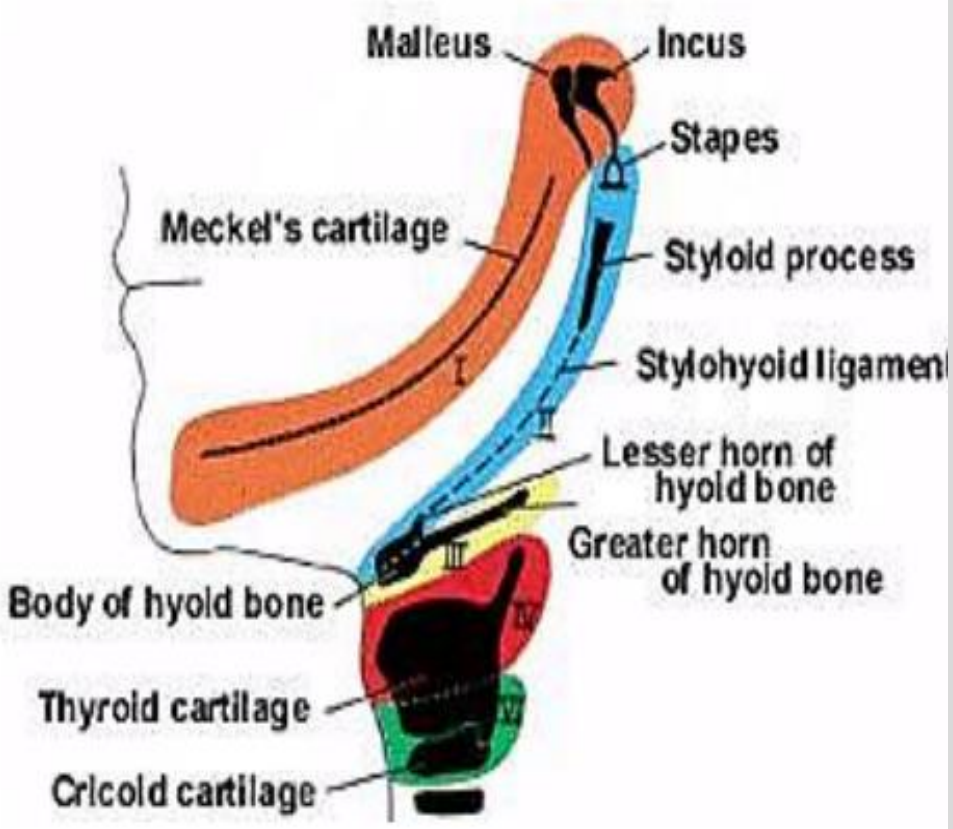
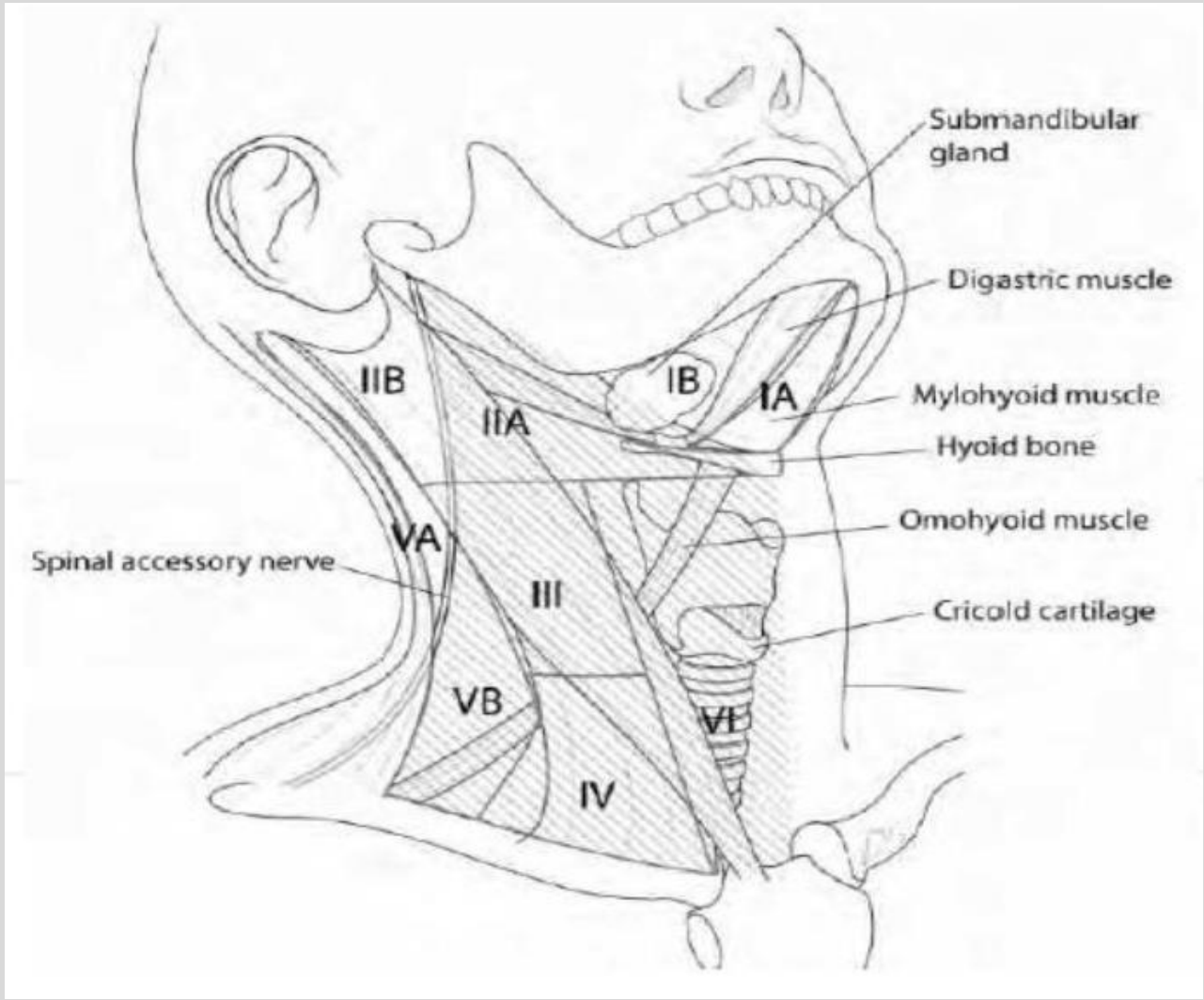
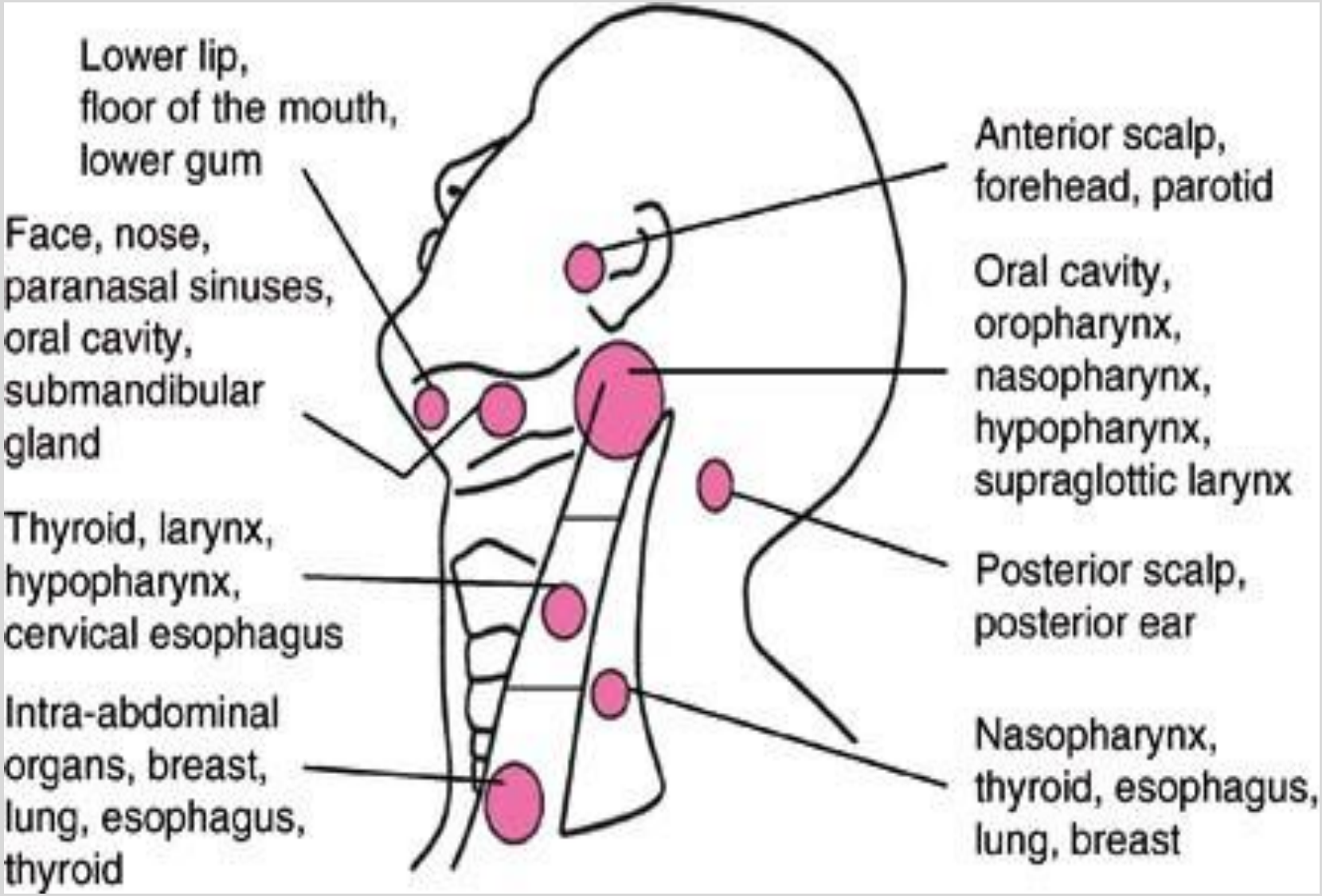


Figure 5: Derivatives of branchial arches


Submandibular gland
Digastric muscle
IIB
IB
IA
IIA
Mylohyoid muscle
Hyoid bone
VA
Omohyoid muscle
Spinal accessory nerve
III
Cricoid cartilage
VB
VI
IV


Lower lip,
floor of the mouth,
lower gum
Face, nose,
paranasal sinuses,
oral cavity,
submandibular
gland
Thyroid, larynx,
hypopharynx,
cervical esophagus
Intra-abdominal
organs, breast,
lung, esophagus,
thyroid
Anterior scalp,
forehead, parotid
Oral cavity,
oropharynx,
nasopharynx,
hypopharynx,
supraglottic larynx
Posterior scalp,
posterior ear
Nasopharynx,
thyroid, esophagus,
lung, breast

General clinical presentation of branchial cyst

- A cyst may present as an external swelling.
- Or cause dysphagia or airway obstruction ::::::::}}} due to its mass effect.
- Or become infected and present as an abscess

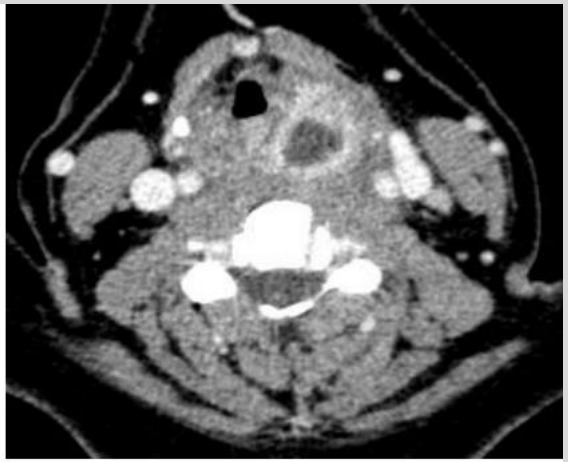


Figure 7: 3rd Branchial cleft cyst presenting as a deep neck abscess

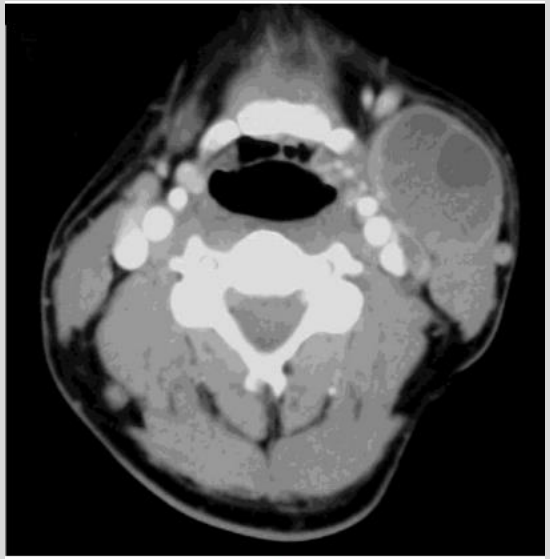


Figure 8: Infected 2nd branchial cleft cyst

	Bone/Cartilage	Nerve
I	Incus, malleus, mandible	V2, V3
II	Stapes, styloid, hyoid (lesser cornu/upper body)	VII
III	Hyoid (greater cornu/ inferior body	IX
IV	Thyroid & epiglottic cartilages	Vagus Superior laryngeal
VI	Cricoid cartilage, Arytenoid cartilages, Corniculate cartilage	Vagus Recurrent laryngeal

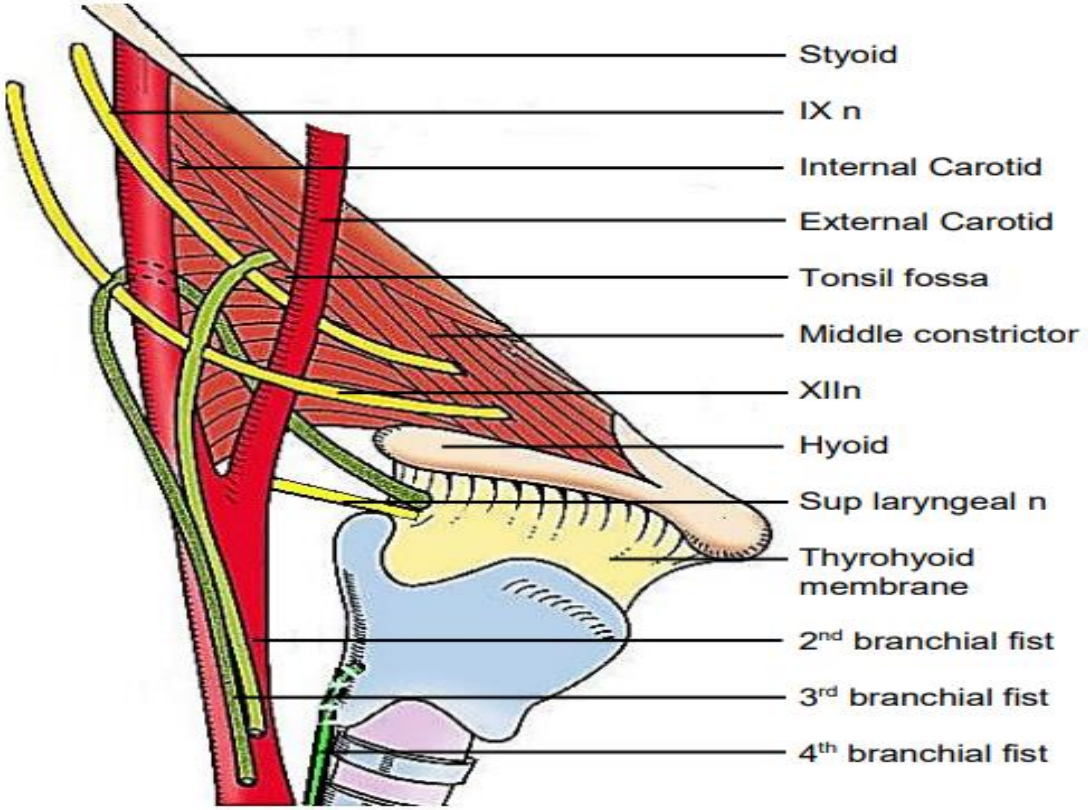
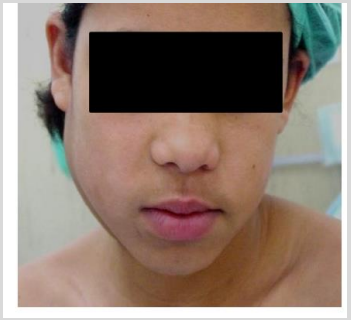
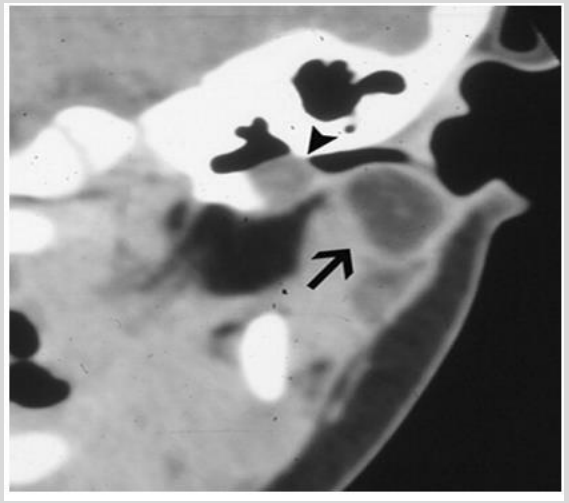
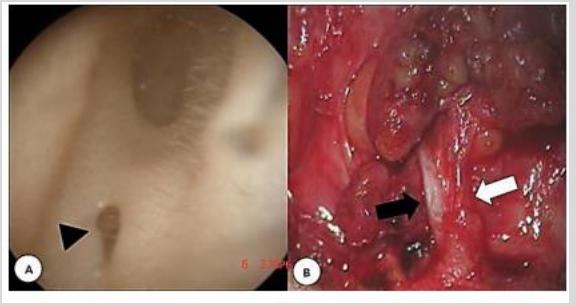


Figure 6: 2nd, 3rd & 4th branchial fistulae: Tracts lie inferior to embryologic derivative of associated arch and superior to derivative of next arch (Adapted from O'Rahily, Muller: Human Embryology & Tera-

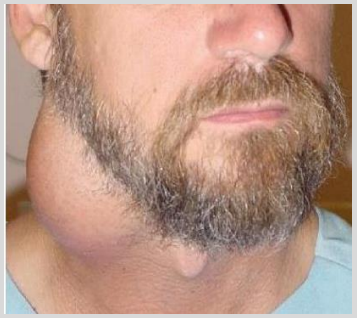
1st branchial cyst/sinus/fistula

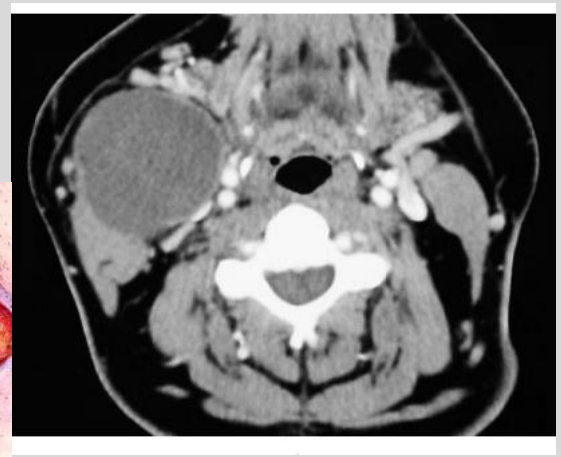


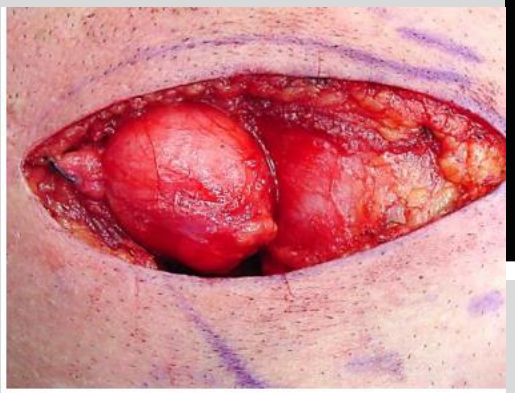




2nd branchial cyst/sinus/fistula







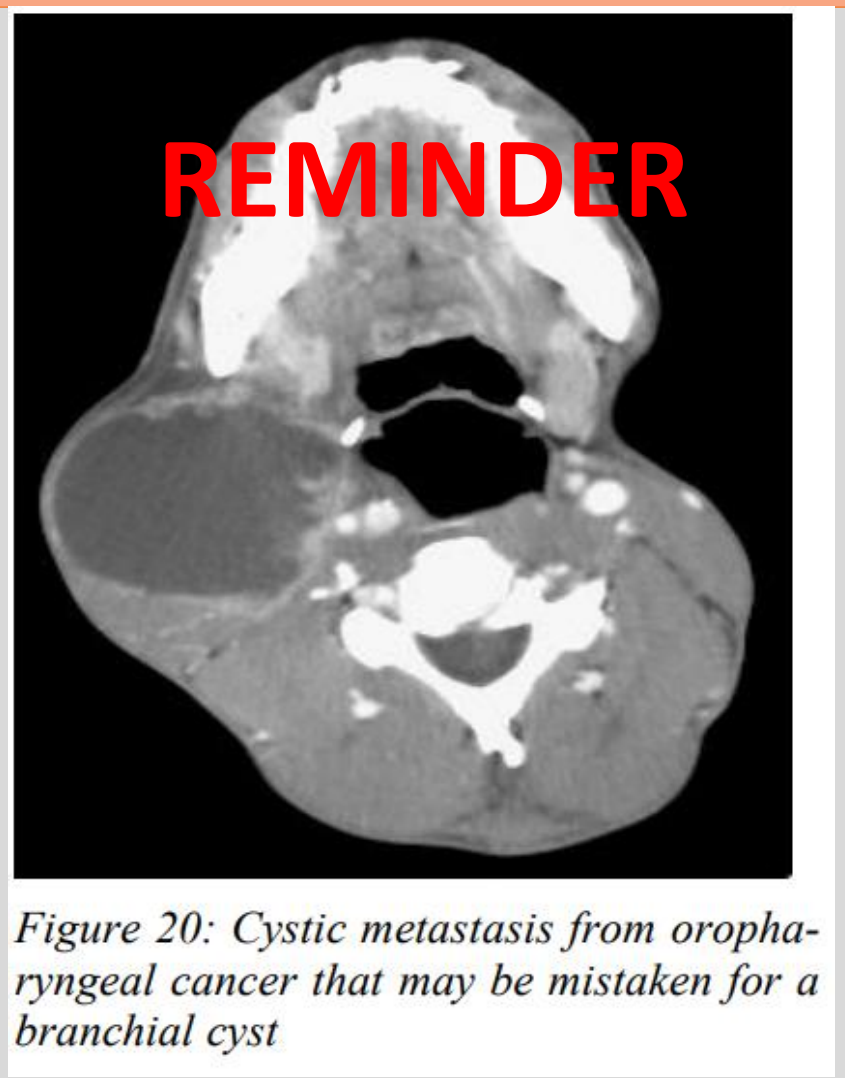
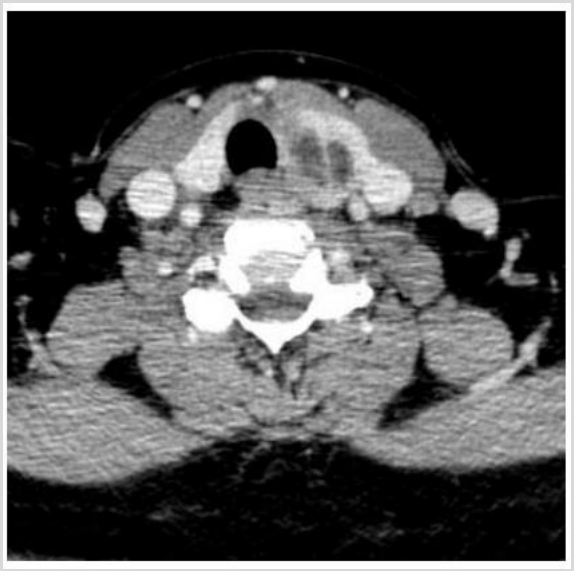
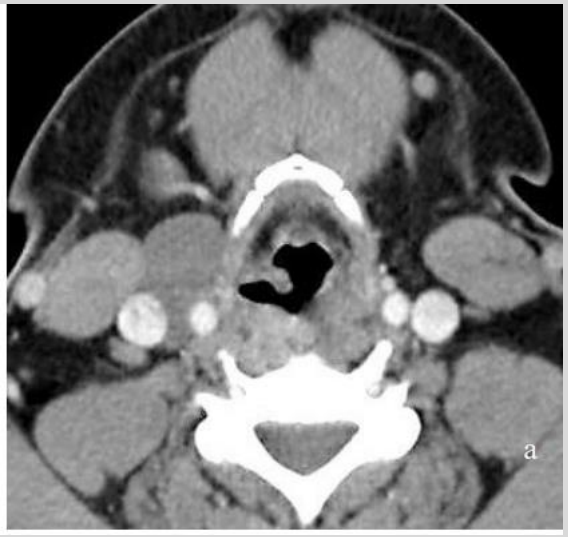


Figure 20: Cystic metastasis from oropha-ryngeal cancer that may be mistaken for a branchial cyst

3rd & 4th Branchial cysts/sinuses/fistulae

- 3rd and 4th branchial cleft cysts are rare. Because of their common origin from the Sinus of His, 3rd and 4th branchial cleft cysts share certain features. They typically present as recurrent cervical abscesses or are misdiagnosed as **acute suppurative thyroiditis**





Thyroglossa duct cyst

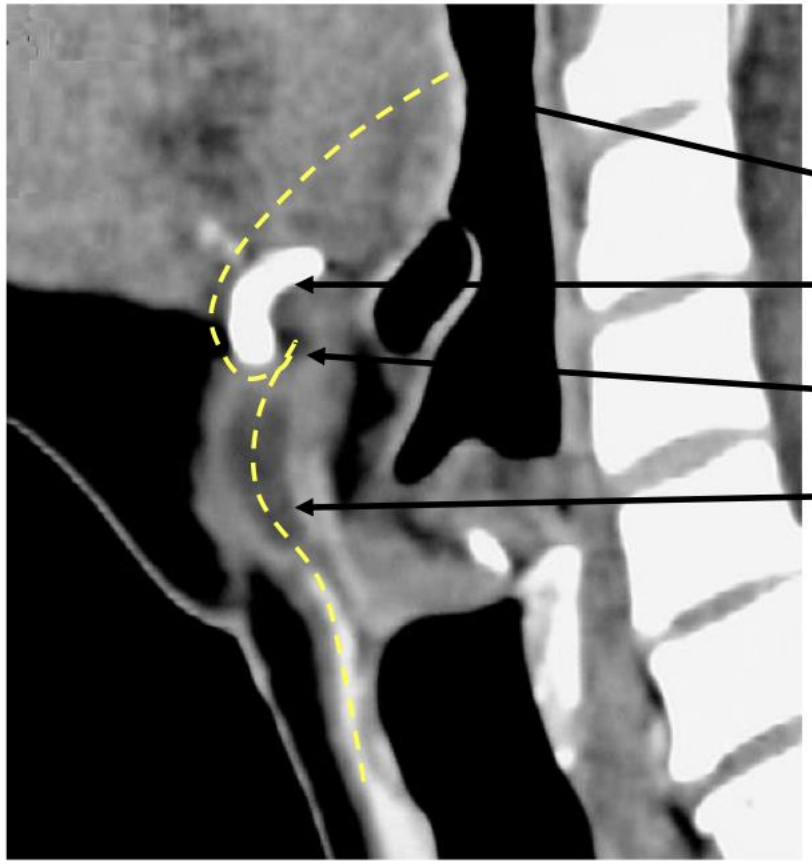
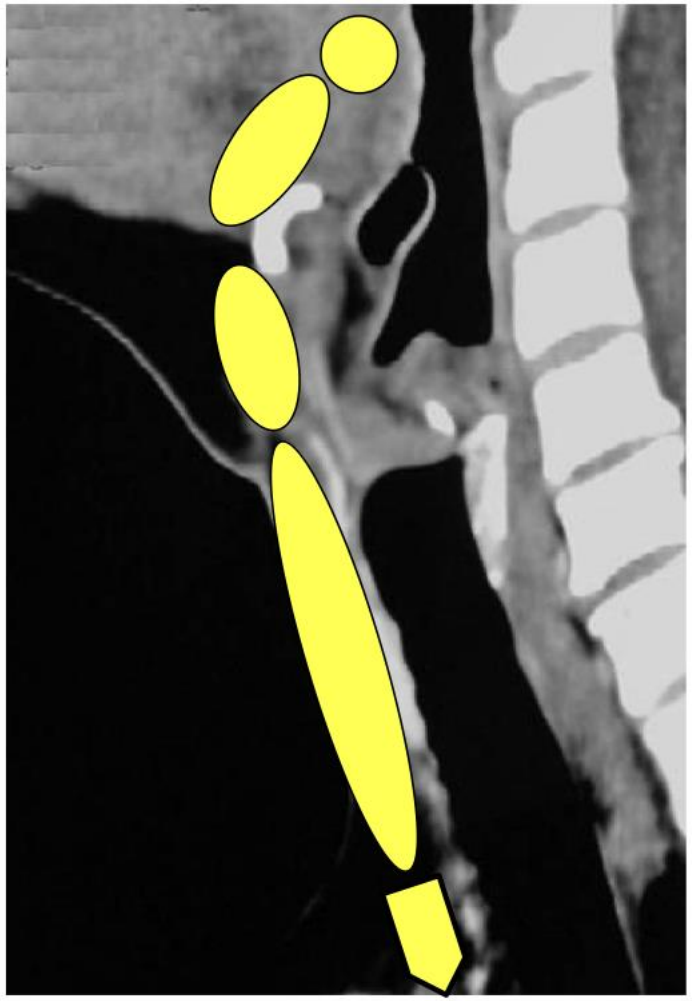


Figure 1: Typical course of thyroglossal duct remnants (yellow line)



Lingual:	2%
Suprahyoid:	24%
Thyrohyoid:	61%
Suprasternal:	13%
Mediastinal:	Rarely

Figure 6: Distribution of thyroglossal duct cysts

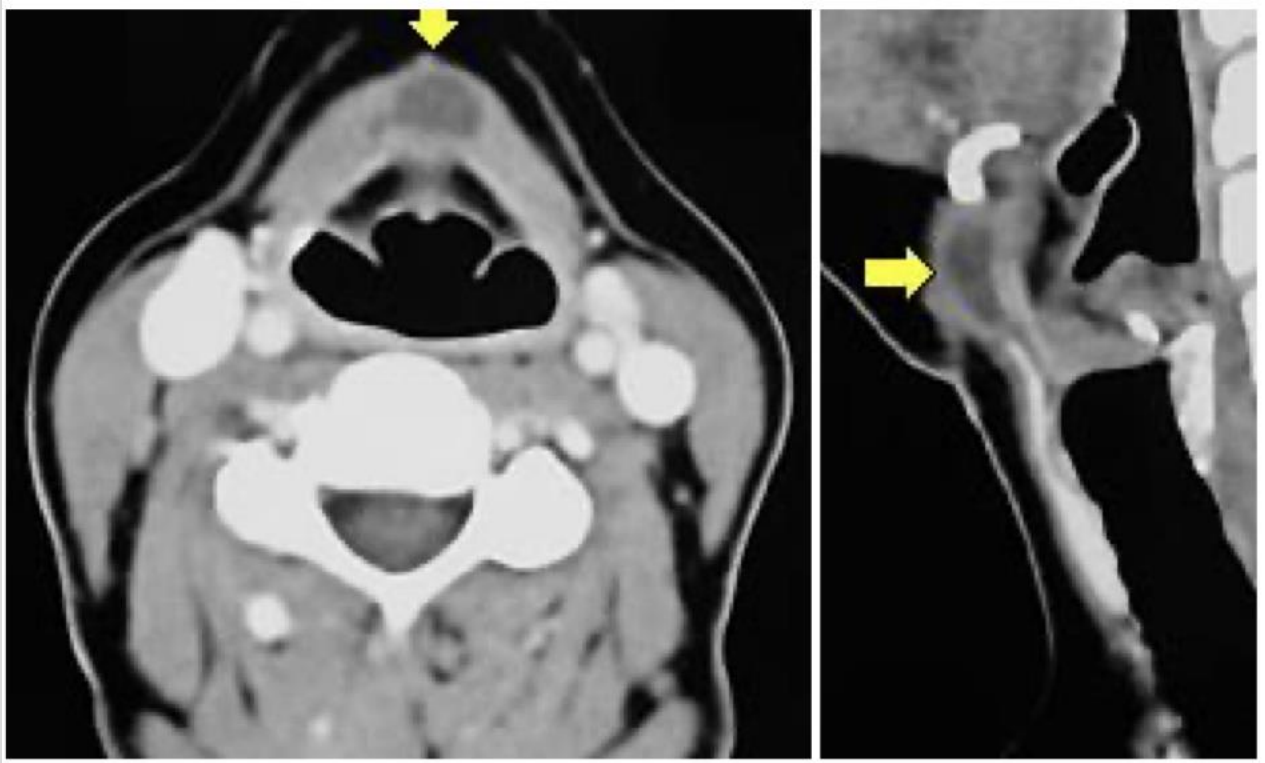


Figure 4: Thyroglossal duct cyst in thyro-hyoid region

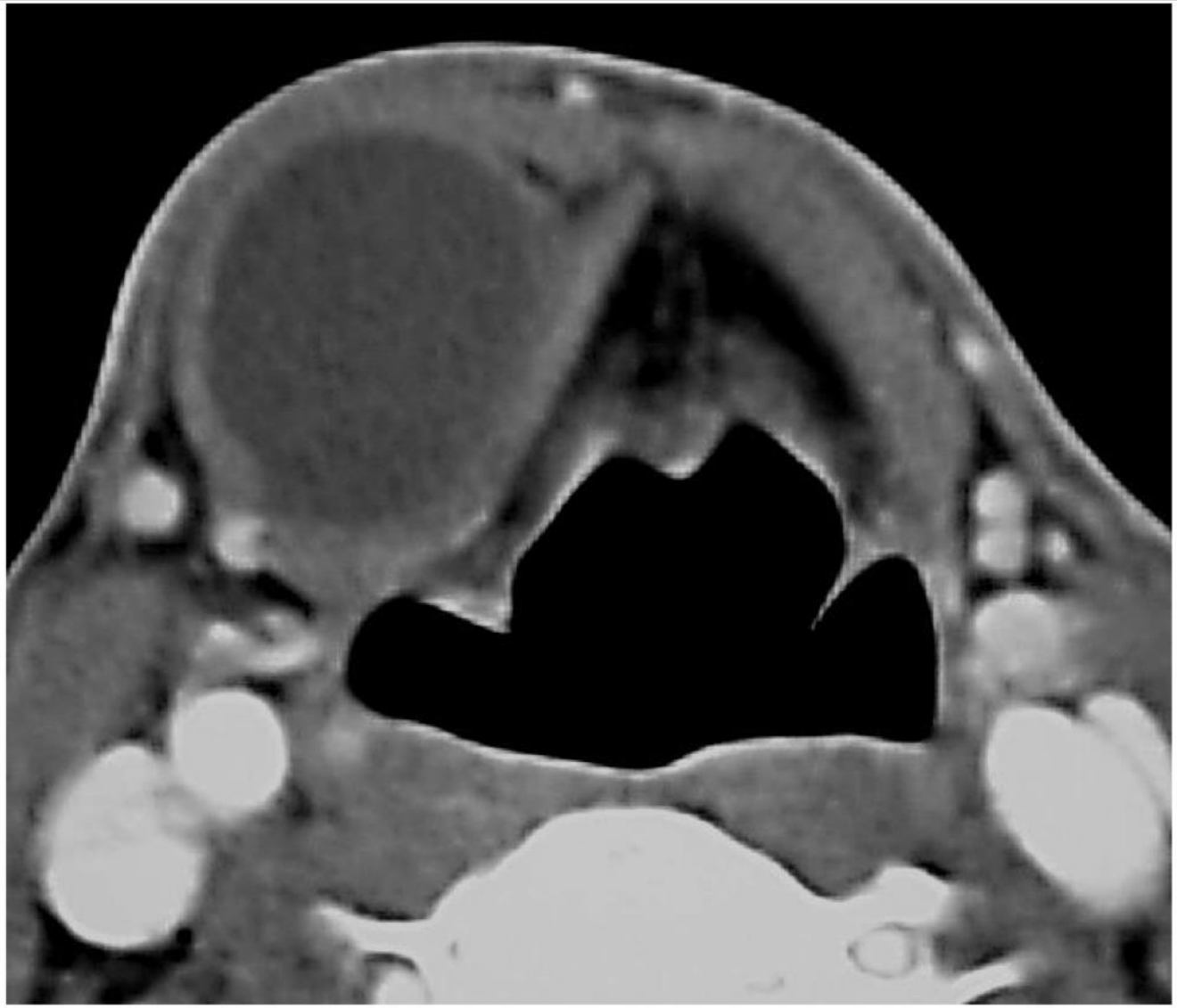


Figure 5: Thyroglossal duct cyst to left of midline overlying lamina of thyroid cartilage

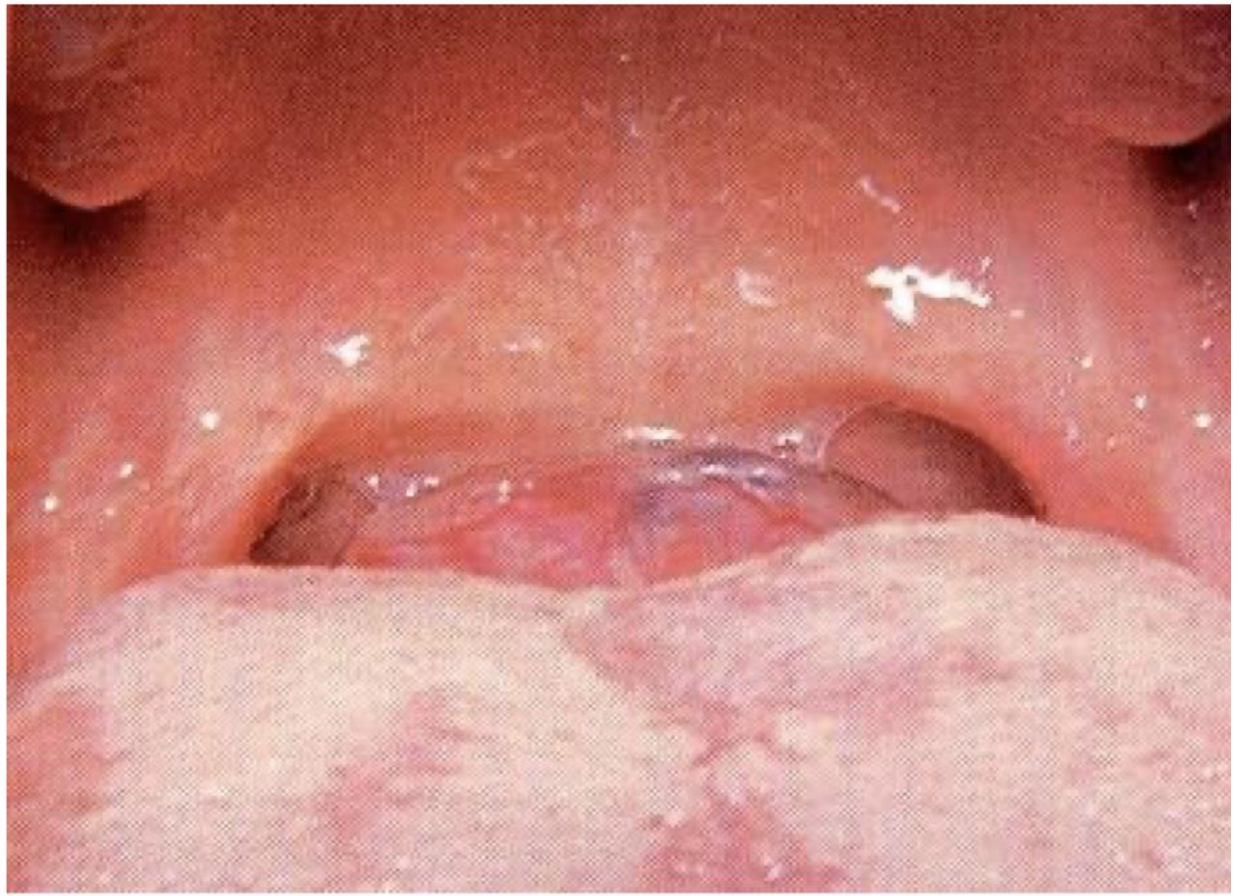


Figure 8: Lingual thyroid

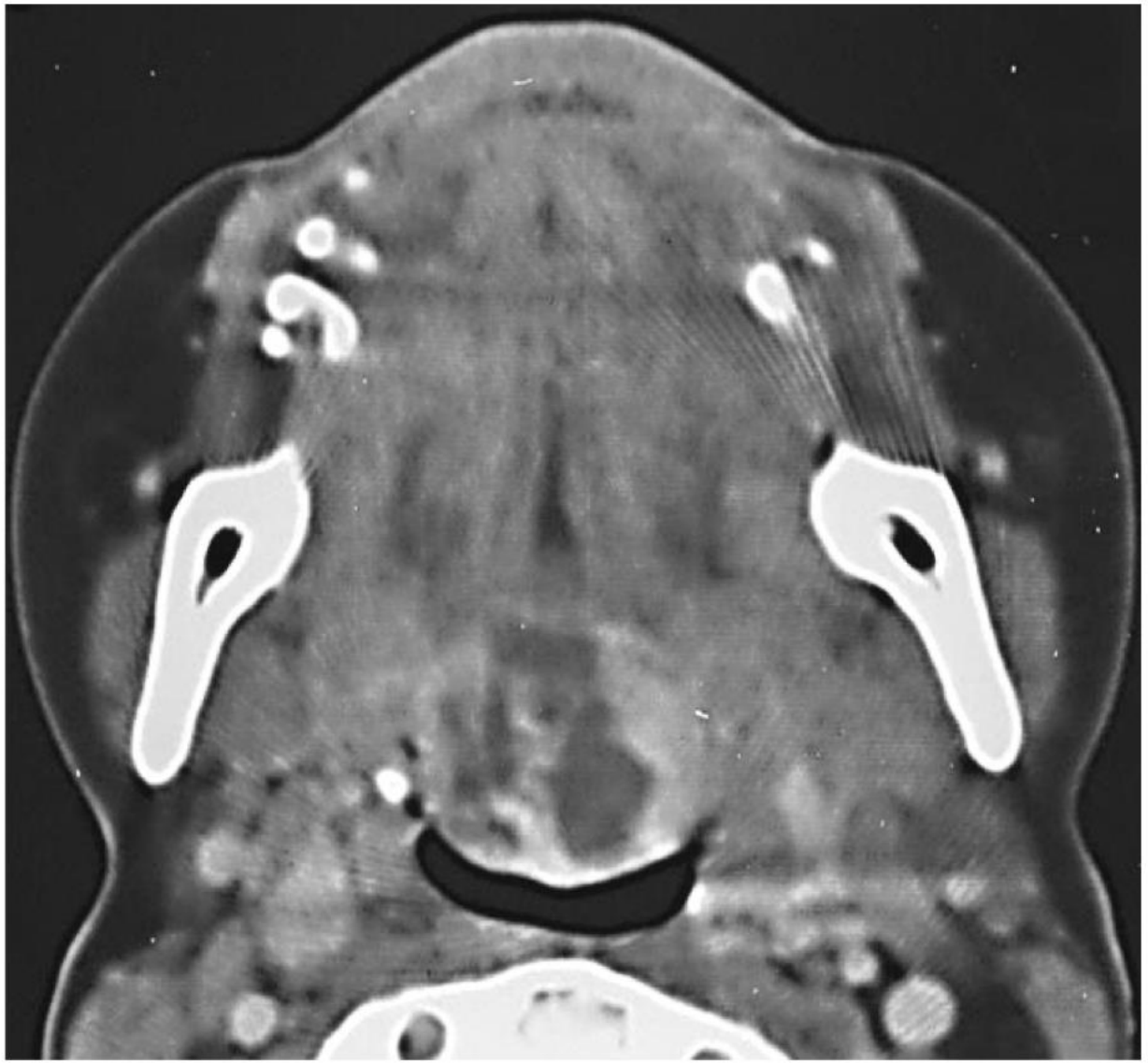
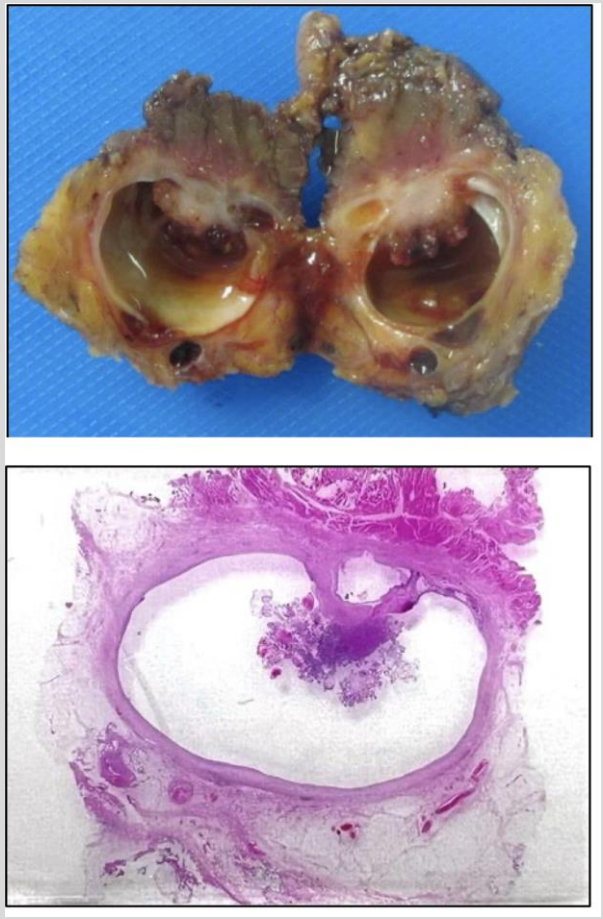
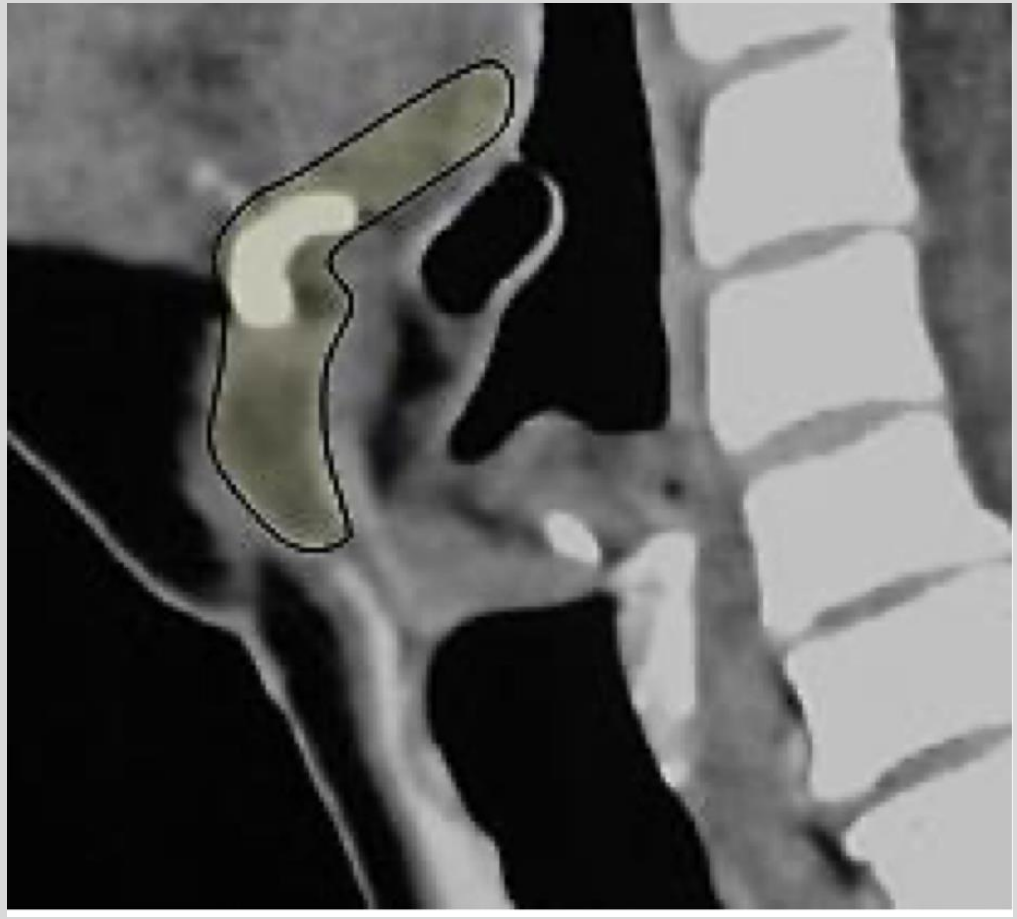


Figure 9: CT scan of lingual thyroid

Papillary carcinoma from the wall
Of cyst



Sistrunk operation



The Adult Neck Mass

- Malignancy is the greatest concern in a patient with a neck mass.
- The risk of having a malignant neck mass becomes greater with increasing age
- Fine-needle aspiration and biopsy for a neck mass are typically indicated when no cause is found for a mass at the initial evaluation.

History

- The patient's age :

Is the most important, because the risk of malignancy becomes greater with increasing age.

- Duration :

Acute symptoms, such as fever, sore throat, and cough, suggest adenopathy resulting from an upper respiratory tract infection. Chronic symptoms of sore throat, dysphagia, change in voice quality, or hoarseness are often associated with anatomic or functional alterations in the pharynx or larynx.

- Recent travel, trauma to the head and neck, insect bites, or exposure to pets or farm animals suggests an ***inflammatory or infectious*** cause for a neck mass.
- A history of smoking, heavy alcohol use, or previous radiation treatment increases the likelihood of malignancy.

Physical Examination

- The skin on the head and neck should be inspected for premalignant or malignant lesions resulting from chronic sun exposure.
- The otologic examination may show a sinus or fistula associated with a branchial anomaly.
- Evidence of chronic sinusitis or pharyngitis suggests reactive adenopathy as the most likely cause of a neck mass.
- Particular attention to ***mucosal surfaces***. For examination of the mucosa, dentures or other dental appliances may need to be removed.
- ***Palpation of the tongue***, including the base of the tongue, can reveal occult lesions.
- Attention should be paid to ulcerations, submucosal swelling, or asymmetry, particularly in the tonsillar fossa.
- Examination of the larynx and pharynx is accomplished by indirect or flexible laryngoscopy.
- Palpation during swallowing or during a Valsalva's maneuver may identify pathology within the larynx and thyroid gland.
- the size of the mass may be measured using calipers or a tape measure

Differential Diagnosis

- **CONGENITAL ANOMALIES**
- *Lateral Neck.*

Branchial anomalies are the most common congenital masses in the lateral neck. (cysts, sinuses, and fistulae), may be present anywhere along the sternocleidomastoid muscle.

Typically soft, slow-growing, and painless. A history of infection, spontaneous discharge, and previous incision and drainage is not uncommon.

Computed tomographic (CT) scanning can usually demonstrate cystic masses medial to the sternocleidomastoid muscle at the level of the hyoid bone in the neck.

Treatment is complete surgical excision, with preparation and examination of frozen sections to exclude malignancy.

Fine-needle aspiration and biopsy should be performed before excision because of the possibility of cystic metastases from squamous cell carcinoma

- Other congenital anomalies of the lateral neck include cystic hygromas (lymphan-giomas) and dermoids.

- ***Central Neck.***

The thyroglossal duct cyst is the most common congenital anomaly of the central portion of the neck. This anomaly is caused by a tract of thyroid tissue along the pathway of embryologic migration of the thyroid gland from the base of the tongue to the neck.

The thyroglossal duct cyst is intimately related to the central portion of the hyoid bone and usually elevates along with the larynx during swallowing.

It may contain the patient's only thyroid tissue.

Thyroid carcinoma has been reported within thyroglossal duct cysts.

Regard the extent of preoperative assessment is controversial and ranges from physical examination to serologic testing and diagnostic imaging.

If serum thyroid function test results are abnormal, thyroid scanning should be performed to determine the amount of thyroid tissue in the neck. Some investigators advocate routine ultrasonography or nuclear scanning to avoid permanent hypothyroidism.

As with branchial cysts, a history of infection, spontaneous discharge, and previous incision and drainage is not uncommon.

The treatment of choice is the Sistrunk procedure, which involves complete excision of the thyroglossal duct cyst, including the central portion of the hyoid bone. If necessary, excision extends to the base of the tongue.

- Other congenital midline neck masses include thymic rests and dermoids.

The child neck mass

- a neck mass in a child is seldom malignant.
- In a review of children with neck masses that were biopsied in a tertiary referral center, 11% were cancerous.It is likely that the malignancy rate would be much lower in a primary care physician’s office.
- In one series, 44% of children younger than five years had palpable lymph nodes, suggesting that benign lymphadenopathy is common in this population.

The child neck mass

- **TIMING**
- The onset and duration of symptoms should be elicited during the initial history.
- A mass present since birth or discovered during the neonatal period is usually benign and developmental. Vascular malformations present at birth and grow with the child, whereas hemangiomas develop a few weeks after birth and have a rapid growth phase.
- Developmental masses may present later in life, either with superimposed infection or with growth over time.
- A new, rapidly growing mass is usually inflammatory. If the mass persists for six weeks, or enlarges after initial antibiotic therapy, a neoplastic lesion must be considered.
- Concern for airway involvement or malignancy should prompt immediate referral or imaging.
- A slowly enlarging mass over months to years suggests benign lesions such as lipomas, fibromas, or neurofibromas.
-

- **ASSOCIATED SYMPTOMS**
- Fevers, rapid enlargement or tenderness of the mass, or overlying erythema indicates a likely inflammatory etiology .
- Most malignant neck masses in children are asymptomatic and are not painful. However, acute infection in a necrotic, malignant lymph node can also occur.
- An upper respiratory tract infection preceding the onset of the mass suggests possible reactive lymphadenopathy or a secondary infection of a congenital cyst.
- Constitutional type B symptoms such as fever, malaise, weight loss, and night sweats suggest a possible malignancy.
- Lymphadenopathy with high fever, bilateral conjunctivitis, and oral mucosal changes with a strawberry tongue likely represents Kawasaki disease

- **RECENT EXPOSURES**
- Recent upper respiratory tract infections; animal exposures (cat scratch, cat feces, or wild animals); tick bites; contact with sick children; contact with persons who have tuberculosis; foreign travel; and exposure to ionizing radiation should be reviewed.
- Medications should also be reviewed because drugs such as phenytoin (Dilantin) can cause pseudolymphoma or can cause lymphadenopathy associated with anticonvulsant hypersensitivity syndrome.

- **LOCATION**
- The location of the neck mass provides many clues to the diagnosis.
- The most common midline cystic neck masses are thyroglossal duct cysts and dermoid cysts .
- Thyroglossal duct cysts are often located over the hyoid bone and elevate with tongue protrusion or swallowing, whereas dermoid cysts typically move with the overlying skin.
- Malignant anterior neck masses are usually caused by thyroid cancer.
- Congenital masses in the lateral neck include branchial cleft anomalies, vascular or lymphatic malformations.
- Lymphadenopathy in the lateral neck can be inflammatory or neoplastic.
- Supraclavicular lymph nodes or those in the posterior triangle (have a higher incidence of malignancy than lymph nodes in the anterior triangle)
- Generalized or multiple anatomic sites of lymphadenopathy increase the chance of malignancy.

- **Examination**
- **PALPATION**
- Shotty lymphadenopathy (multiple small lymph nodes that feel like buckshot under the skin): this usually implies a reactive lymphadenopathy from an upper respiratory tract infection.
- A hard, irregular mass, or a firm or rubbery mass that is immobile or fixed to the deep tissues of the neck may indicate malignancy
- **SIZE**
- Size alone cannot confirm or exclude a diagnosis.
- However, cervical lymph nodes up to 1 cm in size are normal in children younger than 12 years
- Persistent enlarged lymph nodes greater than 2 cm that do not respond to empiric antibiotic therapy should be evaluated for possible biopsy

Table 1. Differential Diagnosis of Neck Masses in Children

	Diagnosis		
Location	*Developmental*	*Inflammatory/reactive*	*Neoplastic*
Anterior sternocleidomastoid	Branchial cleft cyst,* vascular malformation	Reactive lymphadenopathy,* lymphadenitis (viral, bacterial),* sternocleidomastoid tumor of infancy	Lymphoma
Midline	Thyroglossal duct cyst,* dermoid cyst*	—	Thyroid tumor
Occipital	Vascular malformation	Reactive lymphadenopathy,* lymphadenitis*	Metastatic lesion
Preauricular	Hemangioma, vascular malformation, type I branchial cleft cyst	Reactive lymphadenopathy,* lymphadenitis,* parotitis,* atypical mycobacterium	Pilomatrixoma, salivary gland tumor
Submandibular	Branchial cleft cyst,* vascular malformation	Reactive lymphadenopathy,* lymphadenitis,* atypical mycobacterium	Salivary gland tumor
Submental	Thyroglossal duct cyst,* dermoid cyst*	Reactive lymphadenopathy,* lymphadenitis (viral, bacterial)*	—
Supraclavicular	Vascular malformation	—	Lymphoma,* metastatic lesion

**—Type of lesions that are more commonly found in that location.*

Table 2. History and Physical Examination Clues to Diagnosis in Children with a Neck Mass

Finding	*Diagnosis*
History	
Fevers, pain	Inflammatory
Present at birth	Developmental
Rapidly growing mass	Inflammatory, malignancy
Physical examination	
Hard, irregular, firm, immobile	Malignancy
Larger than 2 cm	Malignancy
Midline location	Thyroglossal duct cyst, dermoid cyst, thyroid mass
Shotty lymphadenopathy	Reactive lymph nodes
Supraclavicular location	Malignancy

Table 3. Indications for Ordering Clinical Laboratory or Imaging Studies in the Workup of a Child with a Neck Mass

Test	*Indication*
Bartonella henselae titers	Recent exposure to cats
Complete blood count	Serious systemic disease suspected (e.g., leukemia, mononucleosis)
Computed tomography	Imaging study for retropharyngeal or deep neck abscess, or suspected malignancy
Magnetic resonance imaging	Preferred if vascular malformation is suspected
Purified protein derivative (PPD) test for tuberculosis	Exposure to tuberculosis, young child in rural community (atypical tuberculosis)
Ultrasonography	Recommended initial imaging study for a developmental mass, palpable mass, or suspected thyroid problem
Viral titers (cytomegalovirus, Epstein-Barr virus, human immunodeficiency virus, toxoplasmosis)	If history suggests exposure or a suspected inflammatory mass is not responding to antibiotics

SORT: KEY RECOMMENDATIONS FOR PRACTICE

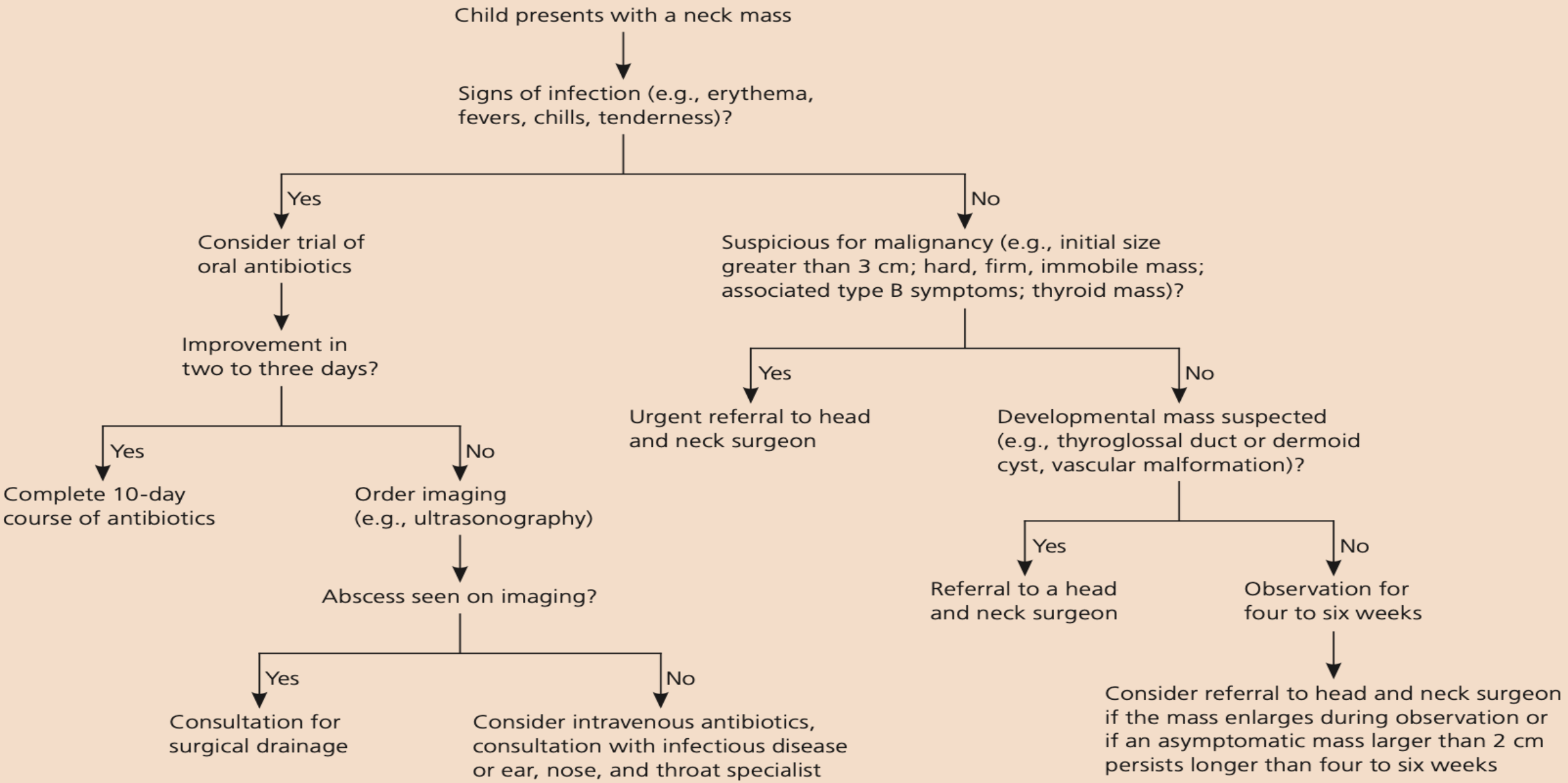
Clinical recommendation	*Evidence rating*	*References*	*Comments*
When indicated, ultrasonography is the preferred initial imaging study for most children with a neck mass.	C	12	Based on expert opinion
Empiric antibiotic therapy with observation for four weeks is acceptable for children with presumed reactive lymphadenopathy.	C	11	Based on a consensus-based practice guideline
Excision of presumed congenital neck masses in children is recommended to confirm the diagnosis and to prevent future problems.	C	1	Based on observational studies
In children, enlarged lymph nodes that are rubbery, firm, immobile, or that persist for longer than six weeks or that enlarge during a course of antibiotics should be considered for biopsy.	C	19, 20	From a consensus guideline based on observational studies

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to http://www.aafp.org/afpsort.

Mass suggests malignancy

- Enlarged lymph node persistent for six weeks
- Firm, rubbery lymph node > 2 cm in diameter
- Hard, immobile mass
- Size increasing during antibiotic therapy
- Supraclavicular mass
- Thyroid mass

Treatment of Children with Neck Masses



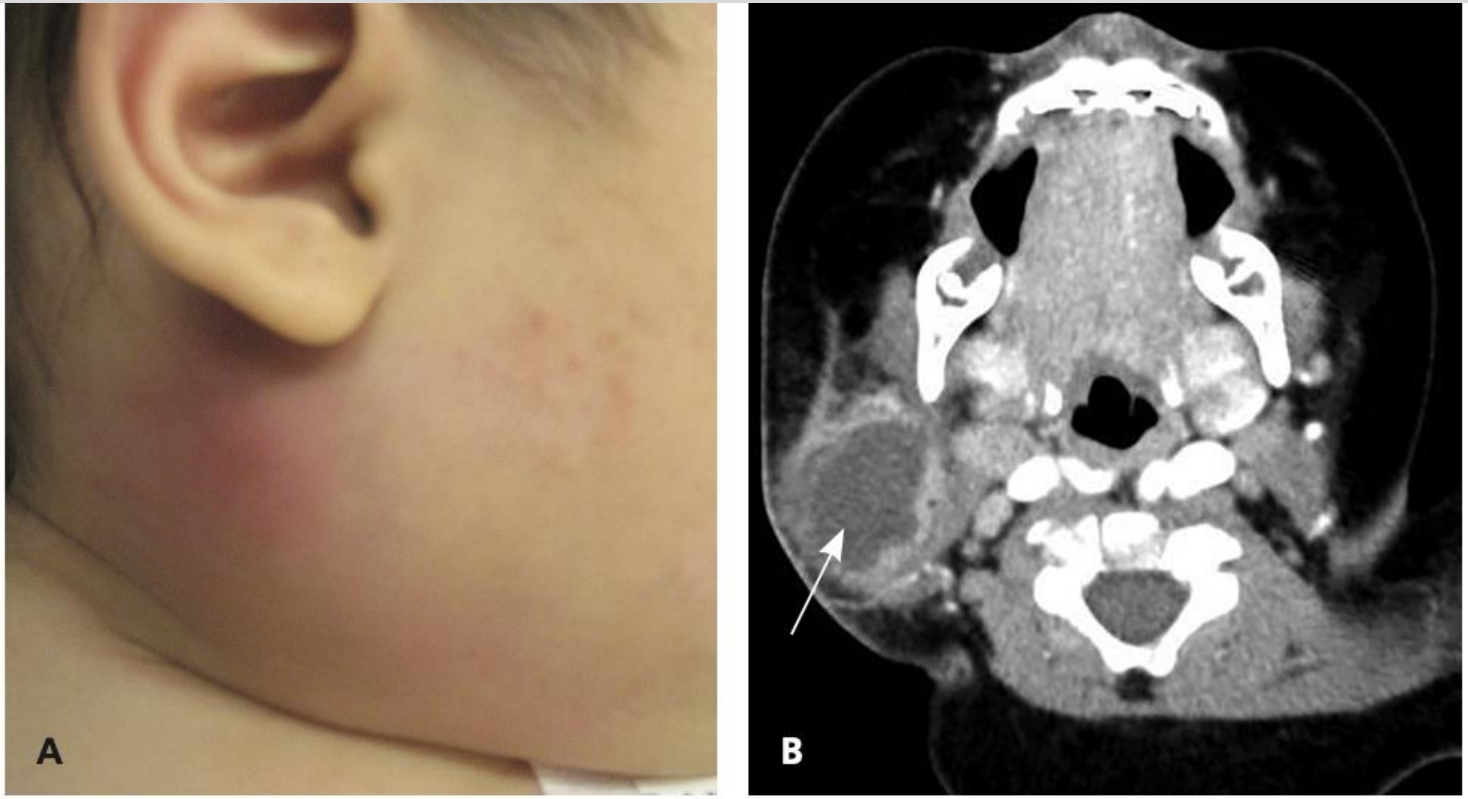


Figure 1. *(A)* Lateral neck mass in a seven-month-old girl. She presented with fever, swelling for three days, overlying erythema, tenderness, and an elevated white blood cell count. *(B)* Computed tomography with contrast media showed a cystic mass (*arrow*) with enhancing rim suggestive of suppurative lymphadenitis. The abscess was incised and drained, and was found to be positive for *Staphylococcus aureus*.

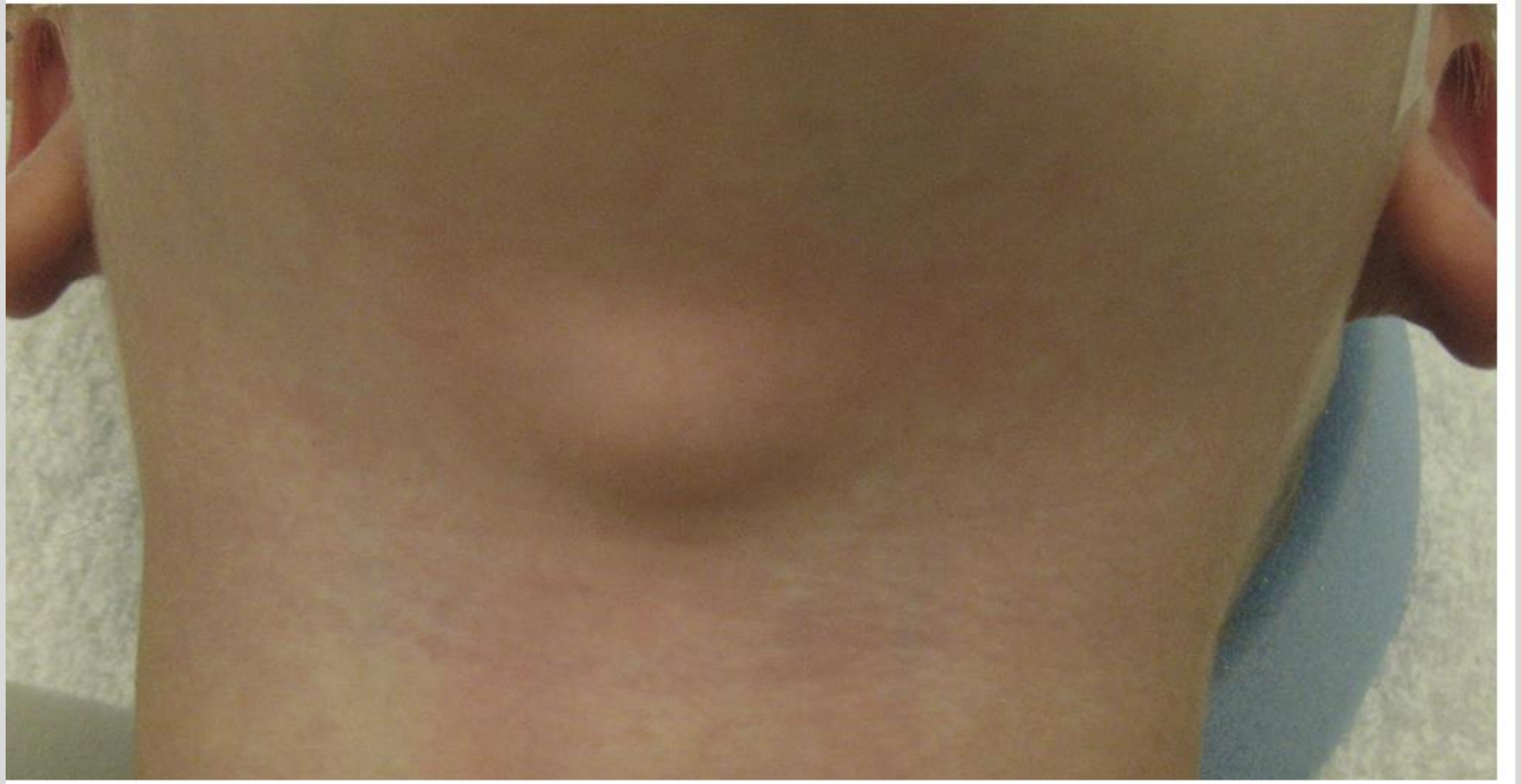


Figure 2. Midline neck mass in a four-year-old boy consistent with a thyroglossal duct cyst.

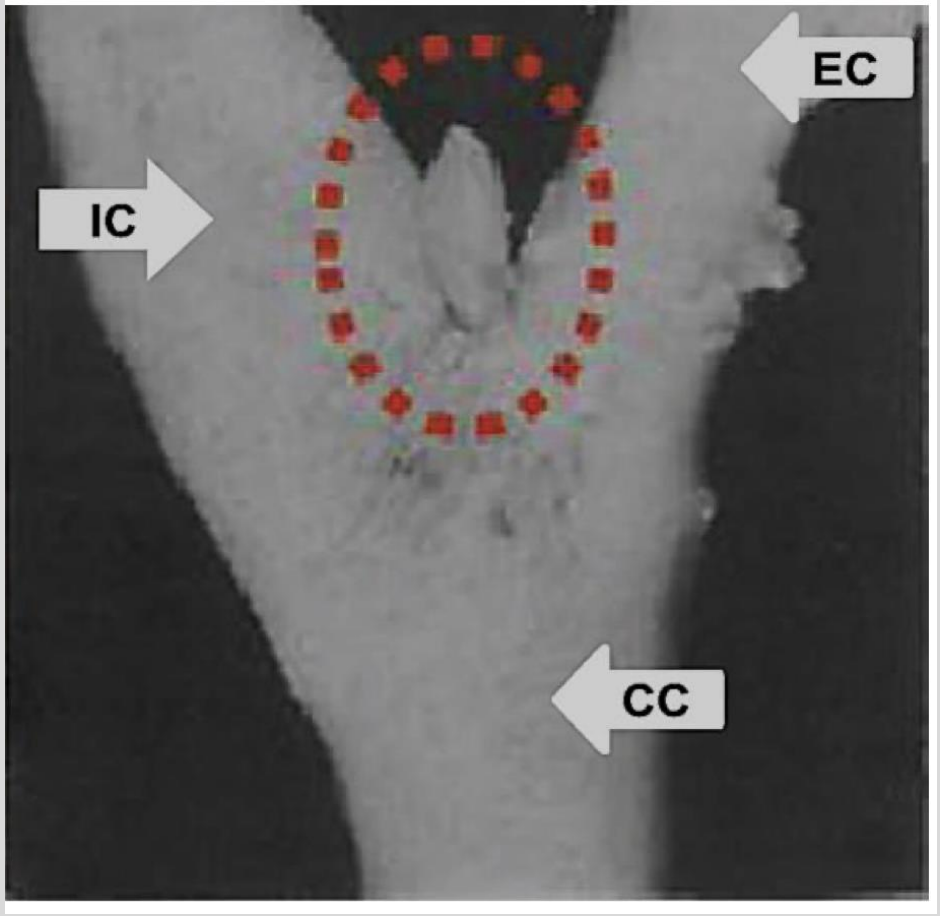
Carotid body tumor

Paragangliomas, also known as glomus tumours or chemodectomas, are neuroendocrine tumours that originate from glomus cells in paraganglia.

They are derived from the embryonal neural crest.

The cells are part of the sympathetic nervous system and serve as chemoreceptors.

They are located in the vascular adventitia of blood vessels which include the carotid bodies in the carotid artery bifurcation



- Paragangliomas occur within the skull base (glomus jugulare, glomus tympanicum), the parapharyngeal space (carotid body tu- mours, vagal paragangliomas), the larynx and the neck, as well as in the chest and the abdomen.
- In the head and neck, the carotid body location is most frequent, followed with decreasing frequency in jugular, tympanic and vagal locations.
- The incidence and prevalence in populations of these rare head and neck tumours remains unclear, as most are benign tumours not captured by cancer registries.
- The reported proportion of malignant paragangliomas is 6 - 19%. The malignant nature is demonstrated only by imaging studies showing local invasion, regional or distant metastasis, since the histological appearance of malignant paragangliomas is identical to that of benign tumors 1.
- Regarding the genetic basis of these tumours, about 90% of paragangliomas are sporadic, but in 1 in 10 patients a mutation in the gene coding for succinate dehydro- genase (SDH) subunits (SDHD, SDHB, SDHC) is observed.
- These patients typically develop multifocal paragangliomas ,under 40 years of age, and also present with ***phaeochromocytomas (***neuroendocrine tumours of the adrenal medulla and are closely related to paragangliomas). Which is Unlike paragangliomas they are *chromaffin positive* and hence secrete catecholamines.

- ***Catecholamine secretion***
- Phaeochromocytoma-like symptoms due to catecholamine secreting tumours occur in 1–3% of patients with paragangliomas in the head and neck
- palpitations, hypertension, headaches, and sweating.
- If left unattended, heart failure and arrhythmia will ensue in the long run.
- Failure to detect catecholamine secretors can lead to life-threating haemodynamic instability during embolisation or surgery.
- Perioperative optimisation includes adrenergic receptor blocking agents. Hence the need to test for free catecholamines so that secretors can be optimised preoperatively. Alternately one can test for urinary metanephrine levels or urinary vanillylmandelic acid (VMA) levels (least expensive, but least specific).
- Because secreting paragangliomas in the head and neck are so uncommon, raised catecholamines should prompt one to exclude the presence of a phaeochromocytoma.
- Proton pump inhibitors may cause false positive elevation of serum chromogranin A; if elevated, PPIs should be discontinued for a week and the test repeated.

Genetic screening

A family history is associated with increased likelihood of multiple paragangliomas and of patients presenting at an earlier age.
There are various genetic mutations of which 10% are hereditary .

Paragangliomas also occur in MEN syndromes types 2A and 2B.

- ***Multiple paragangliomas***
- About 10% of carotid body tumours are bilateral. Multiple paragangliomas should be suspected in patients with a positive family history and with head and neck paragangliomas that have raised catechol- amines *(Fig*

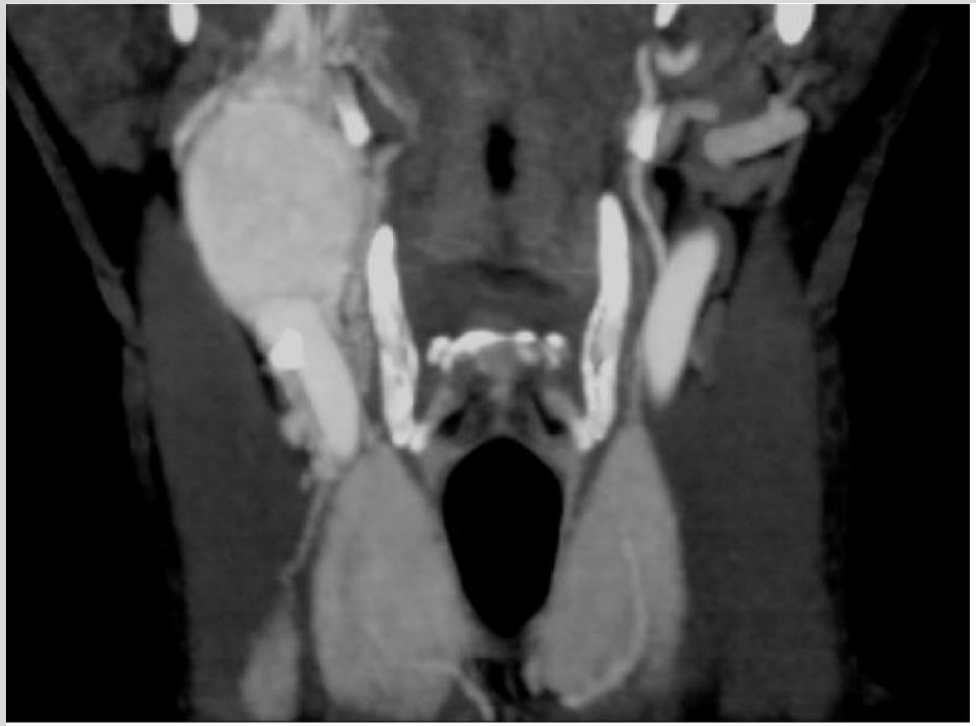


Figure 2: Coronal CT scan shows contrast enhancement of a carotid body tumour

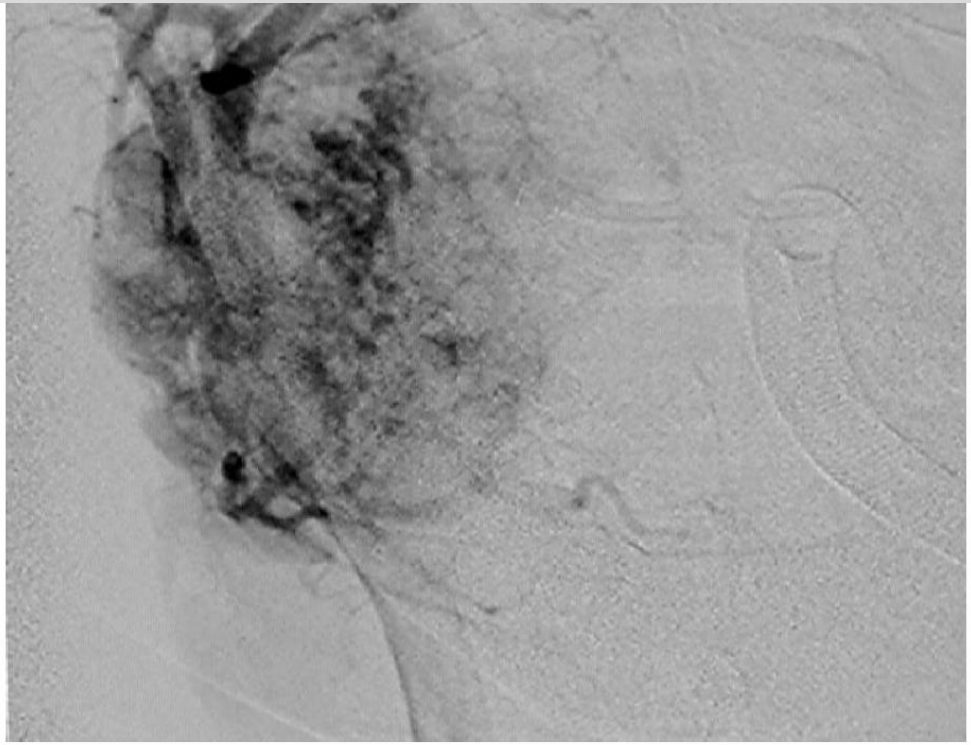
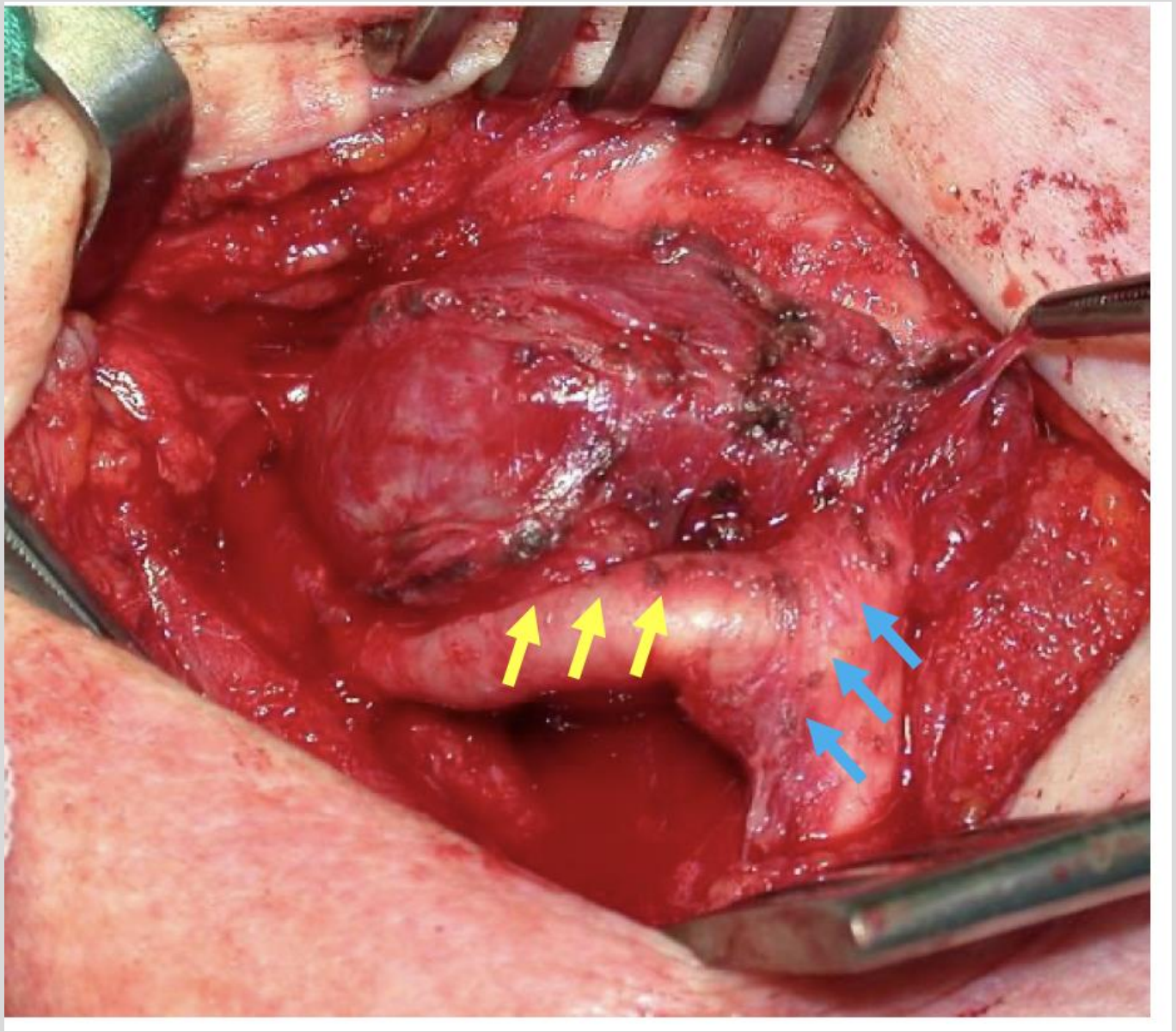


Figure 4: Angiogram illustrating vascularity of a carotid body tumour



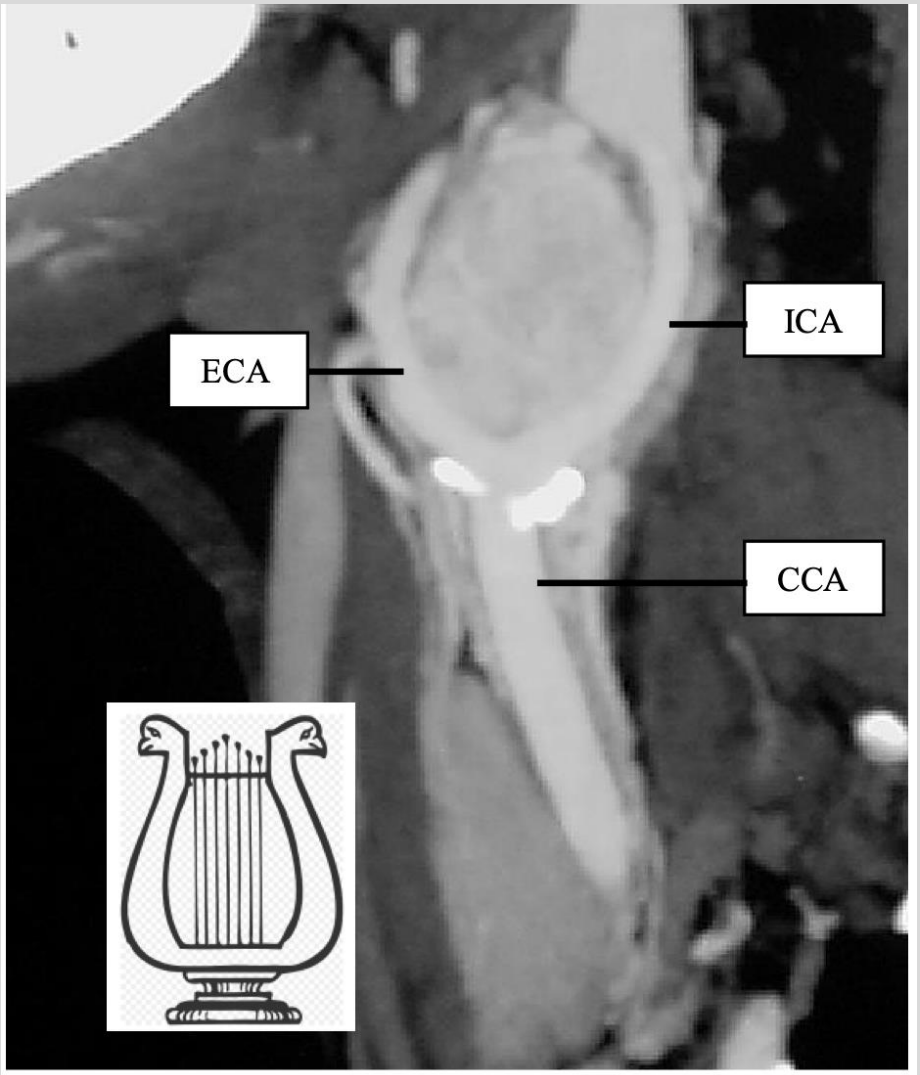


Figure 8a: Splayed carotid bifurcation (Lyre sign)

Carotid Body tumor Vs. Vagal Paraganglioma

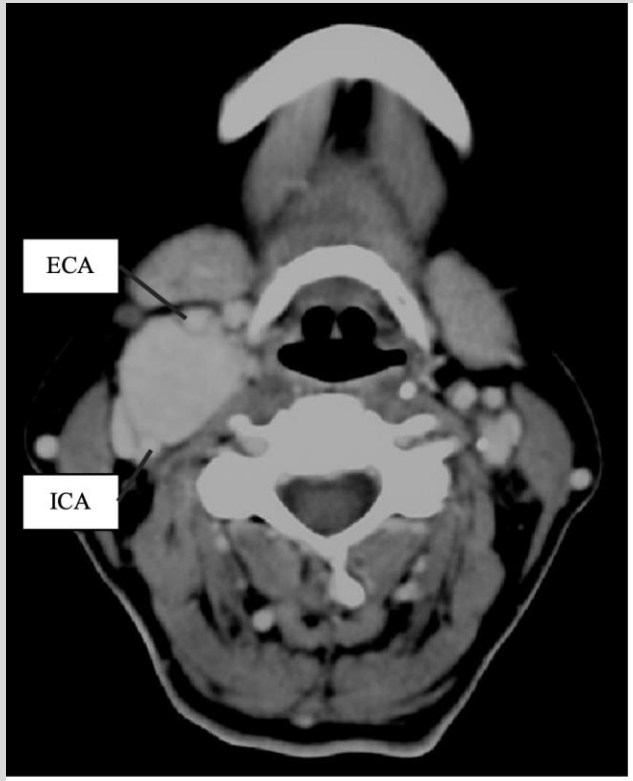
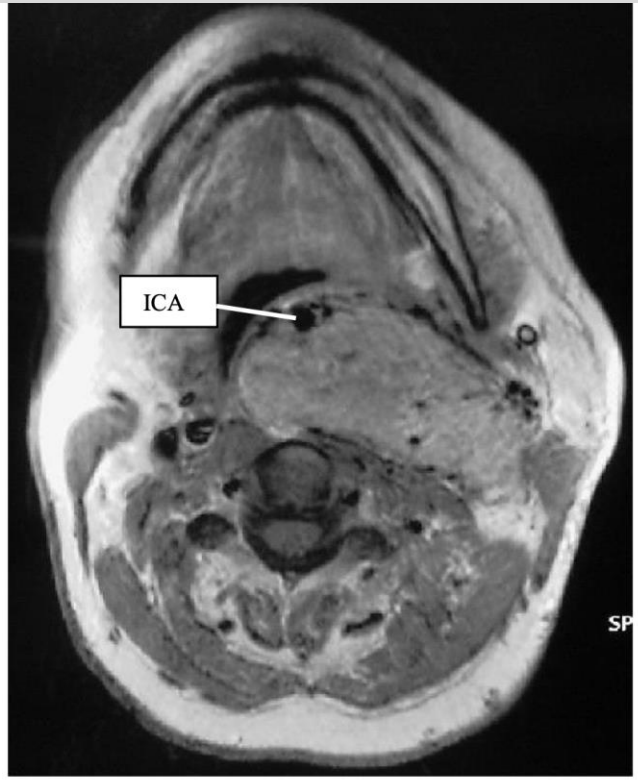
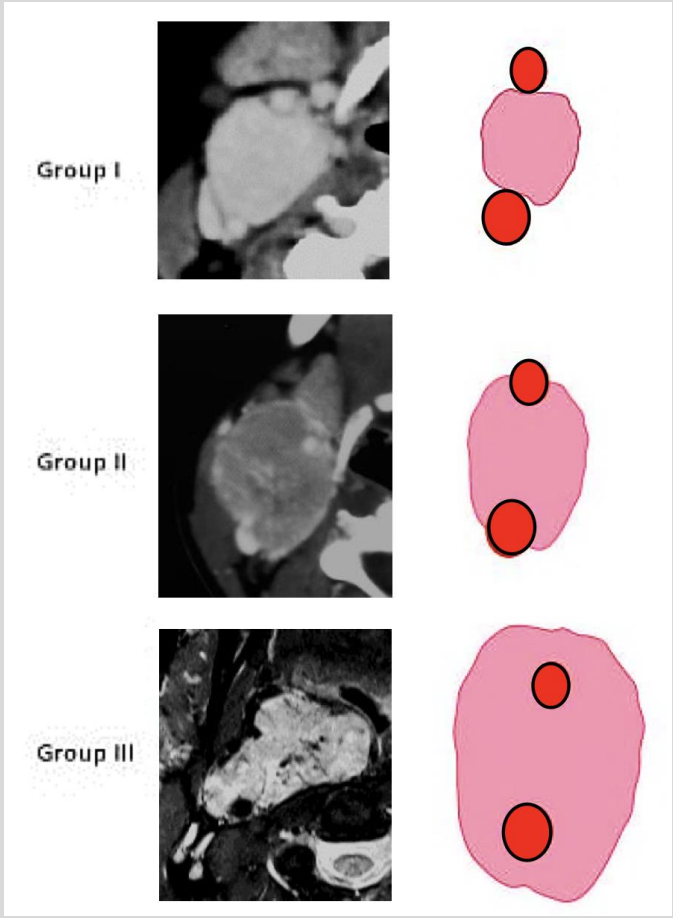


Figure 8b: Carotid body tumours splay the internal and external carotid arteries



Figures 9b: Vagal paraganglioma typically displaces the internal carotid artery anteriorly

Shamblin classification



Surgical approach

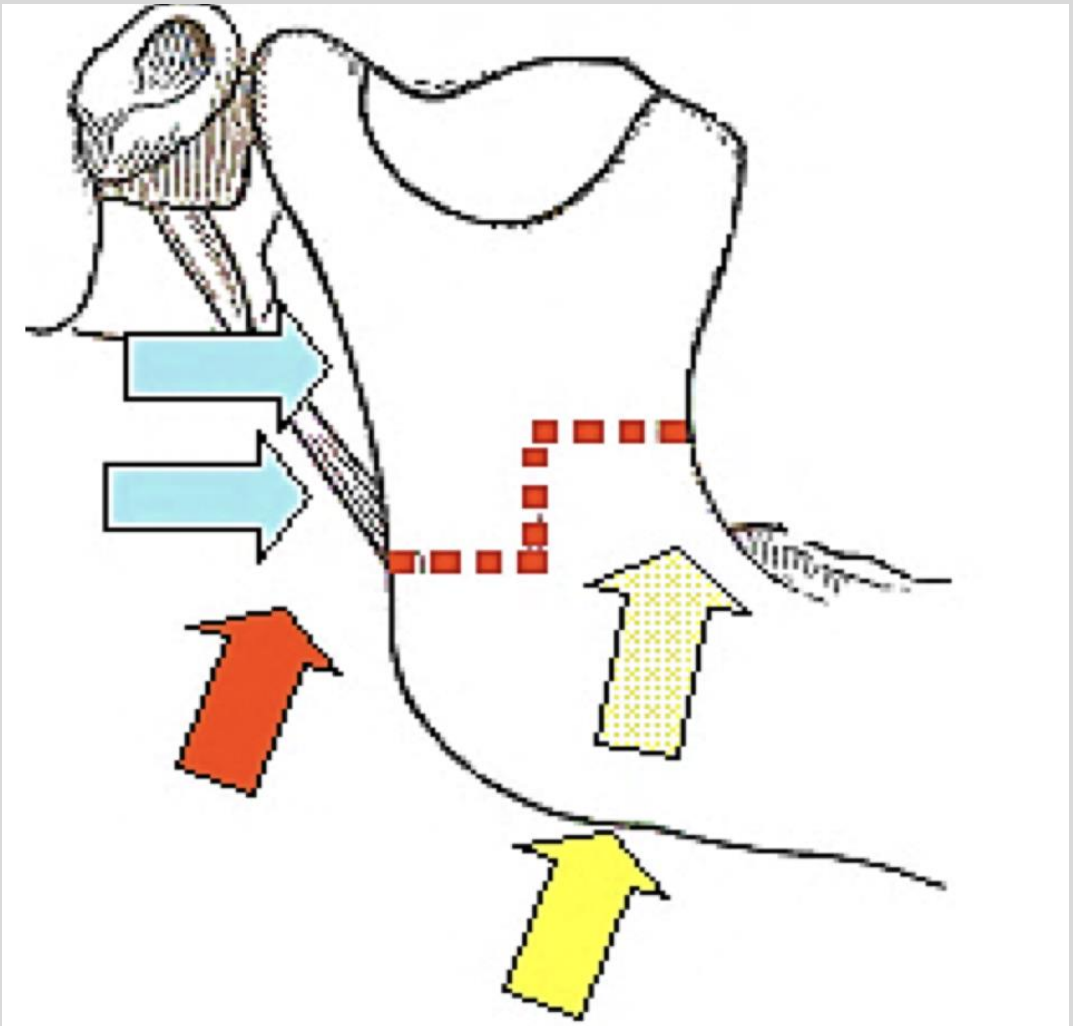


Figure 12: Surgical approaches: transcervical submandibular (yellow), transparotid (blue), and transcervical ± mandibulotomy (red)

Multiple paragangliomas

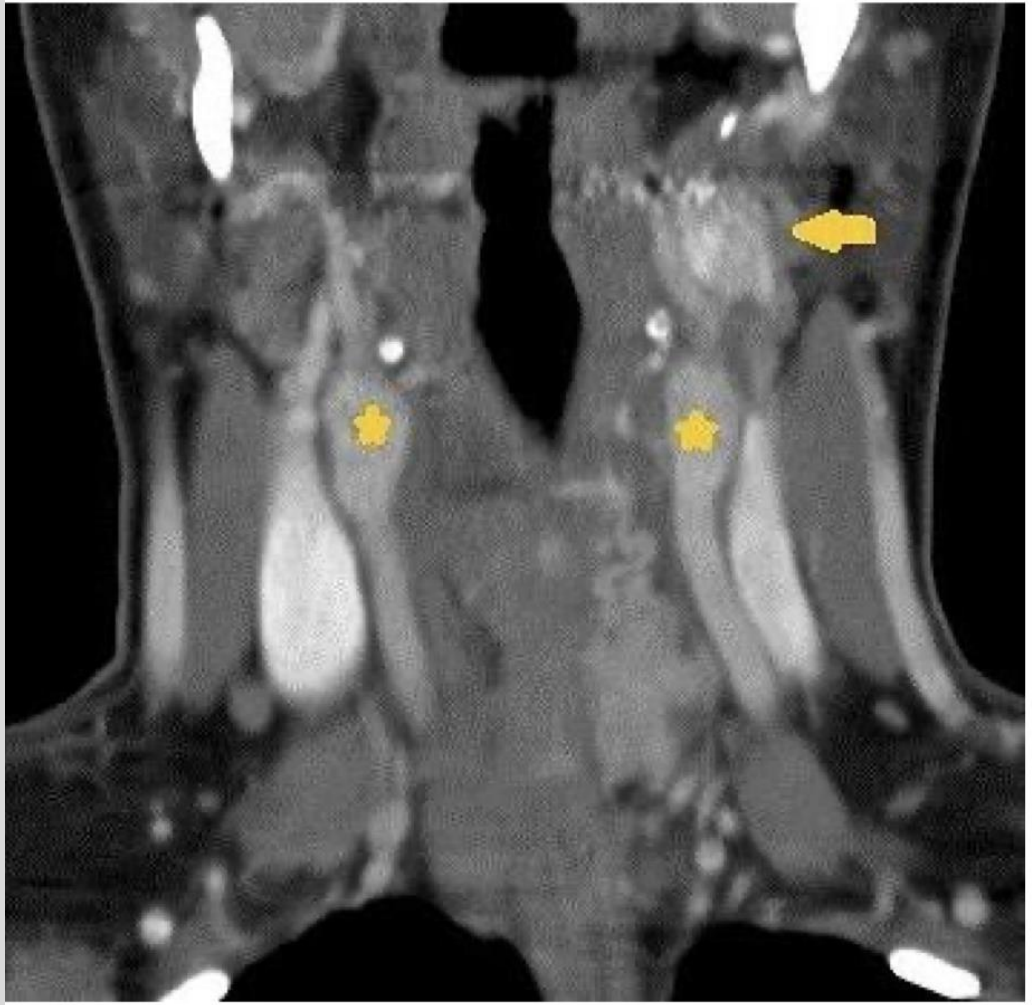


Figure 7: Bilateral carotid body tumours (*) and left vagal paraganglioma (arrow) in a patient with a SDH-D mutation. Following this diagnosis the patient's brother was also diagnosed with an SDH-D mutation and multiple paragangliomas

Juvenile nasopharyngeal angiofibroma (JNA)

- Rare tumour representing only about 0.05% of head and neck tumours.
- The most common presentation is a prepubescent or adolescent male with severe, recurrent epistaxis and nasal obstruction. The epistaxis may even require a blood transfusion.
- JNAs occur exclusively in males, a hormonal theory has been im- plicated.
- An adolescent male with recurrent epistaxis and chronic nasal obstruction is highly suspicious for a JNA.
- Other common symptoms include headache, facial swelling, unilateral rhinorrhoea, hyposmia, and ipsilateral conductive hearing loss due to Eustachian tube dysfunction.
- Due to the vascularity of these tumours, preoperative embolization of major feeding vessels by interventional radiology leads to significantly less blood loss and facilitates endoscopic resection.

Sphenopalatine artery

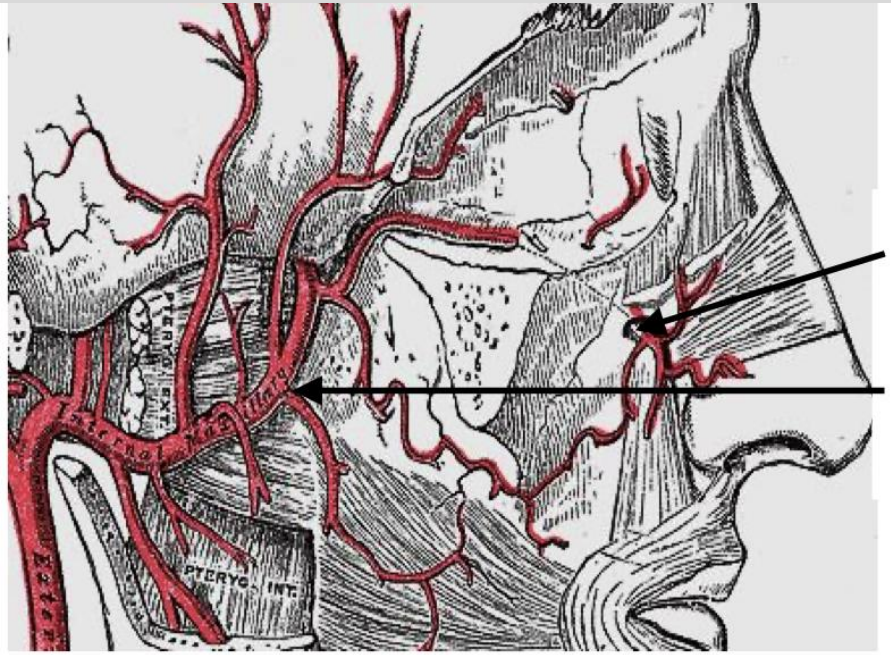
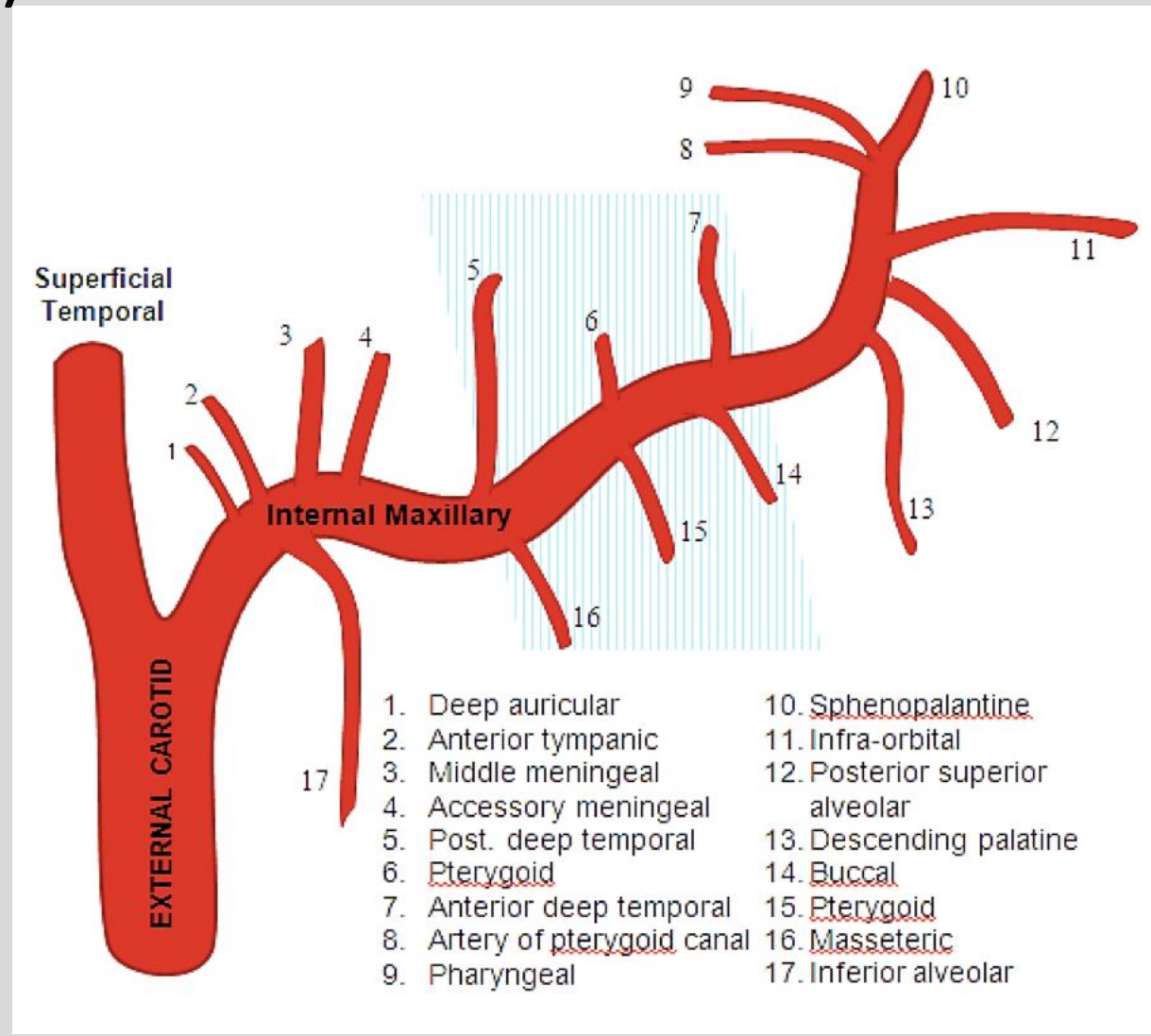


Figure 1: Internal maxillary artery entering pterygopalatine fossa through pterygomaxillary fissure (mandible removed)



Pterygopalatine fossa

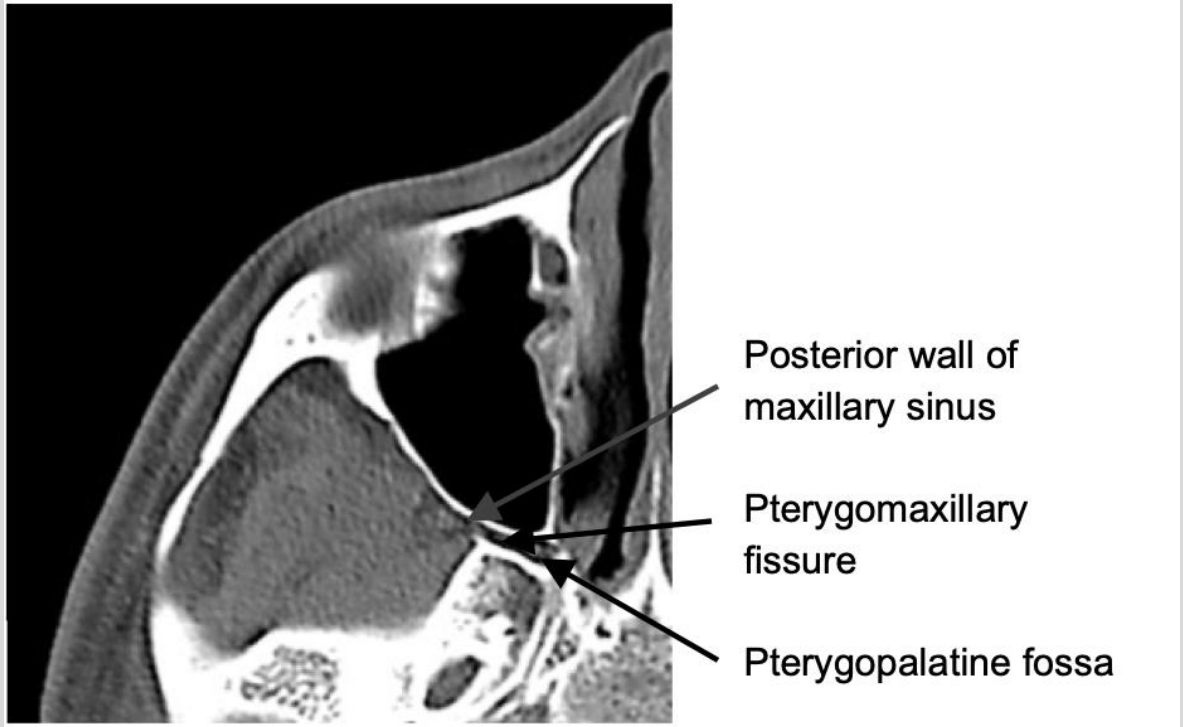


Figure 7: Axial cut at level of infraorbital nerve and orbital floor

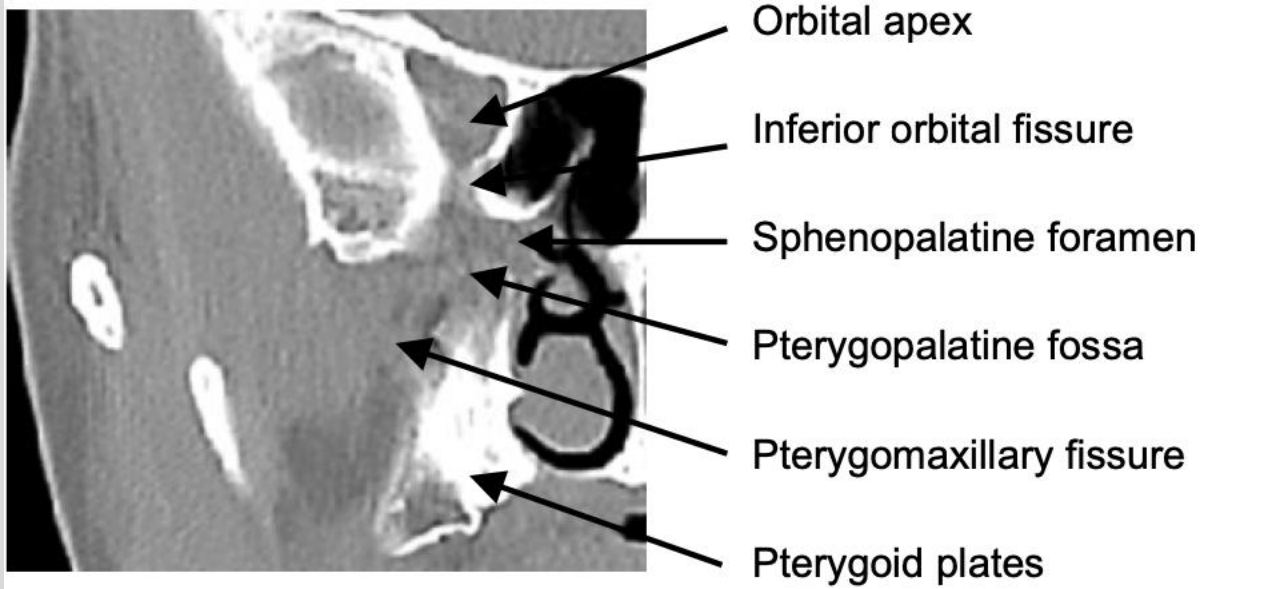


Figure 9: Coronal cut immediately behind the maxillary sinus through the orbital apex, pterygoid plates and pterygopalatine fossa

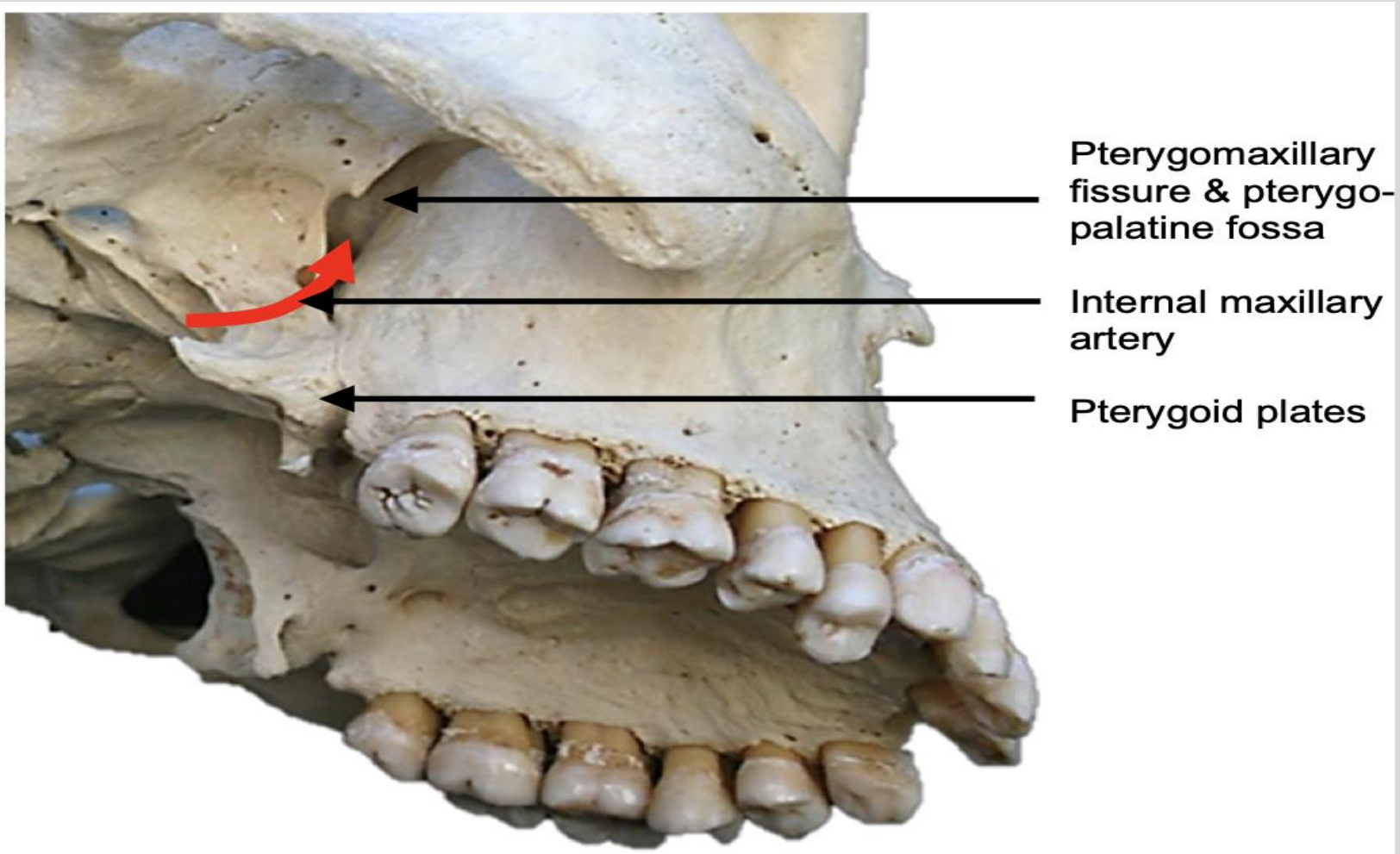


Figure 6: Internal maxillary artery (red arrow) traverses the pterygomaxillary fissure to enter the pterygopalatine fossa

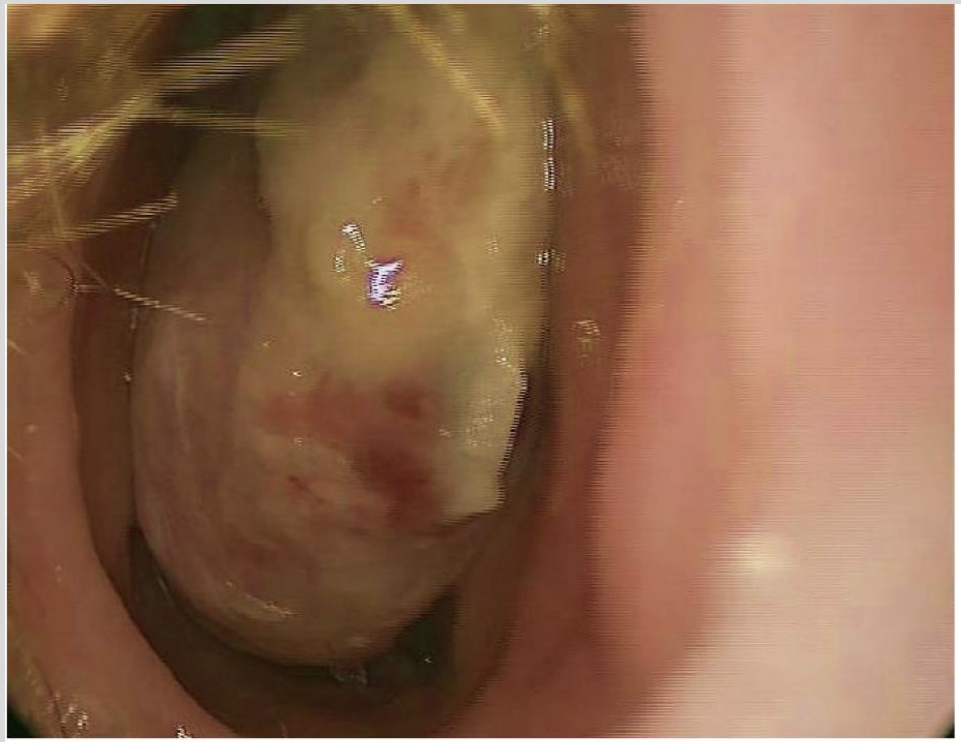


Figure 11: View of right nasal cavity showing large, vascular mass

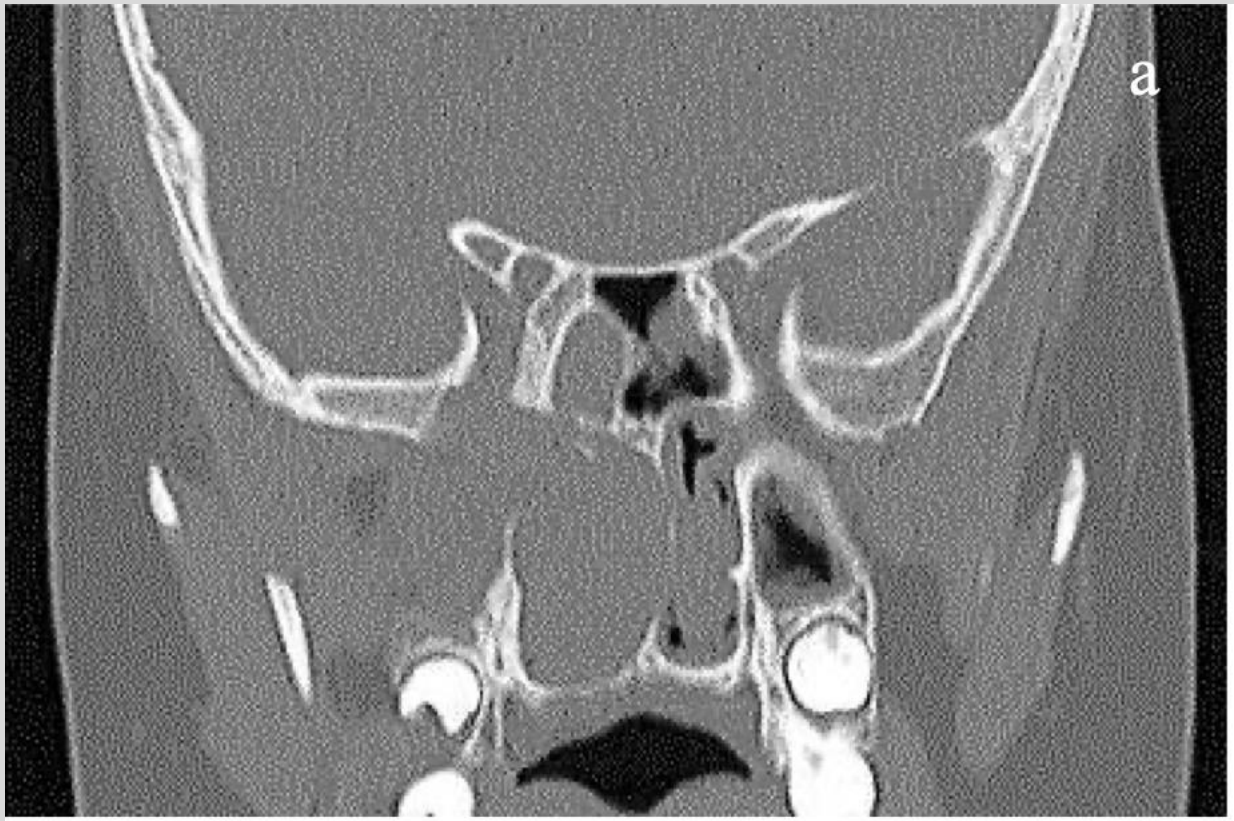


Figure 12a: CT scan: Widening of the sphenopalatine foramen and nasal cavity

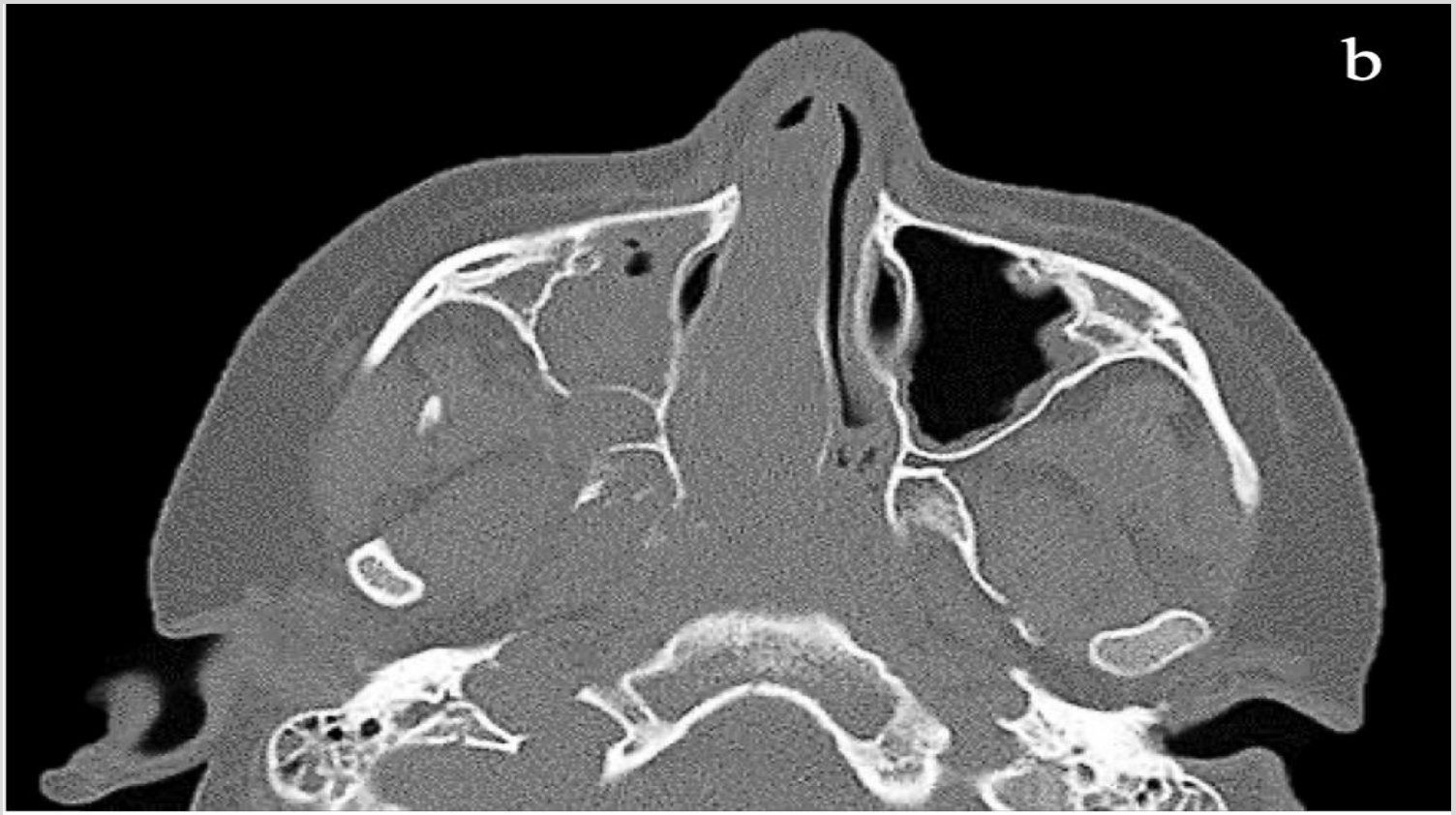
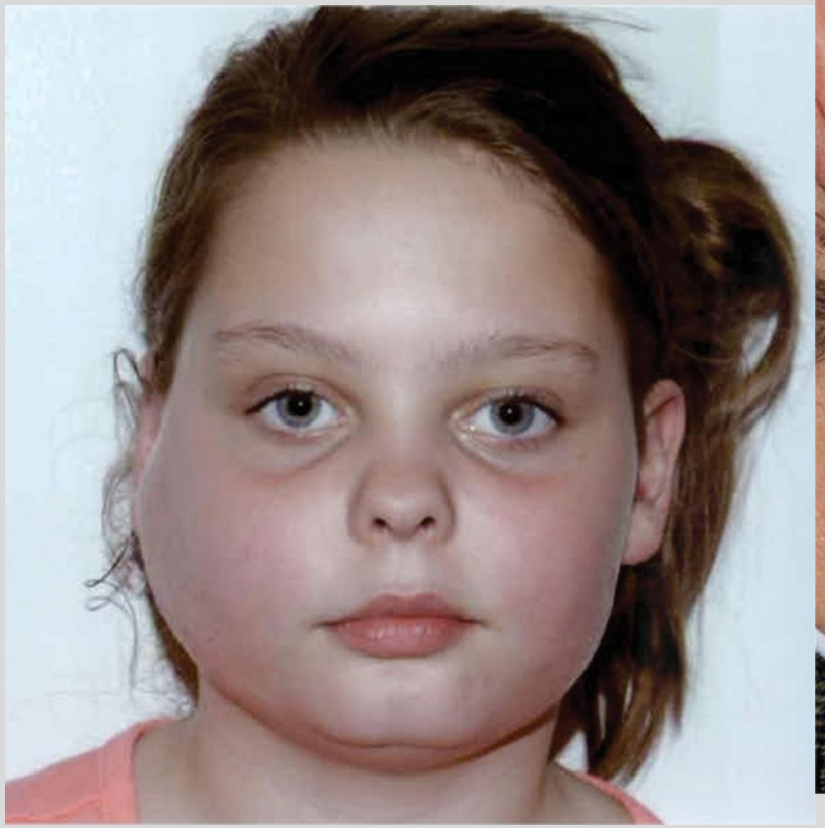


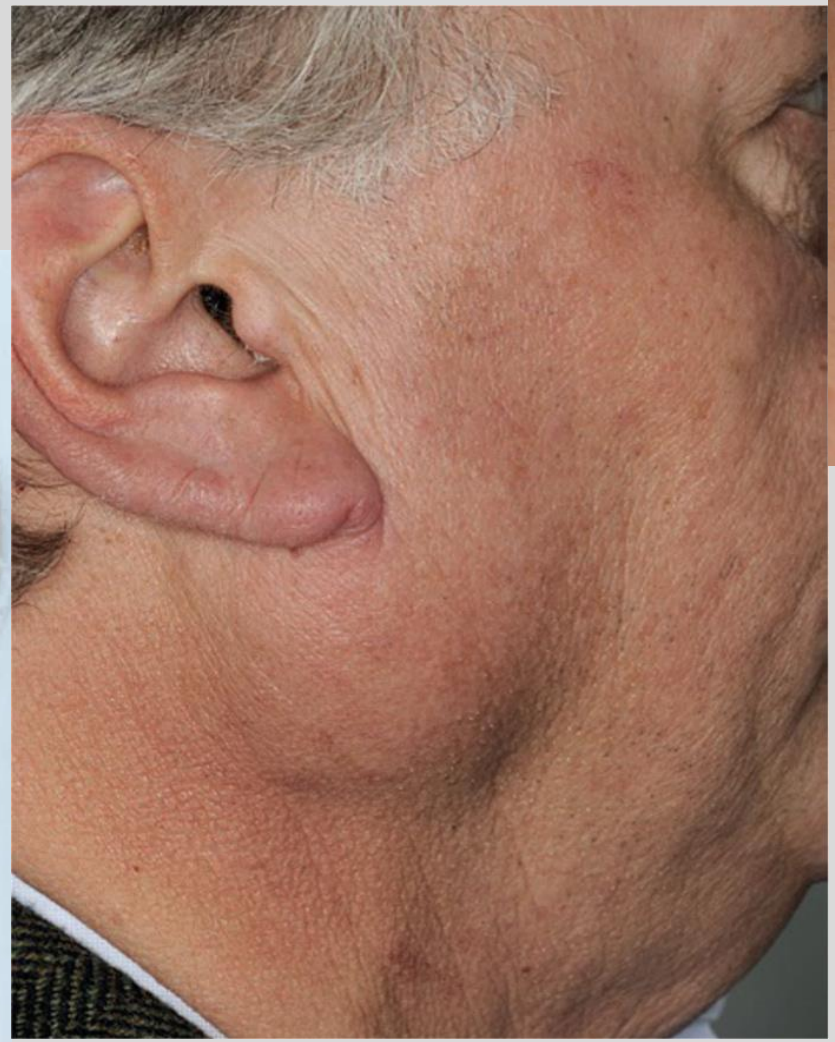
Figure 12b: CT scan: Anterior bowing of posterior wall of maxillary sinus (Holman-Miller sign) and nasal mass

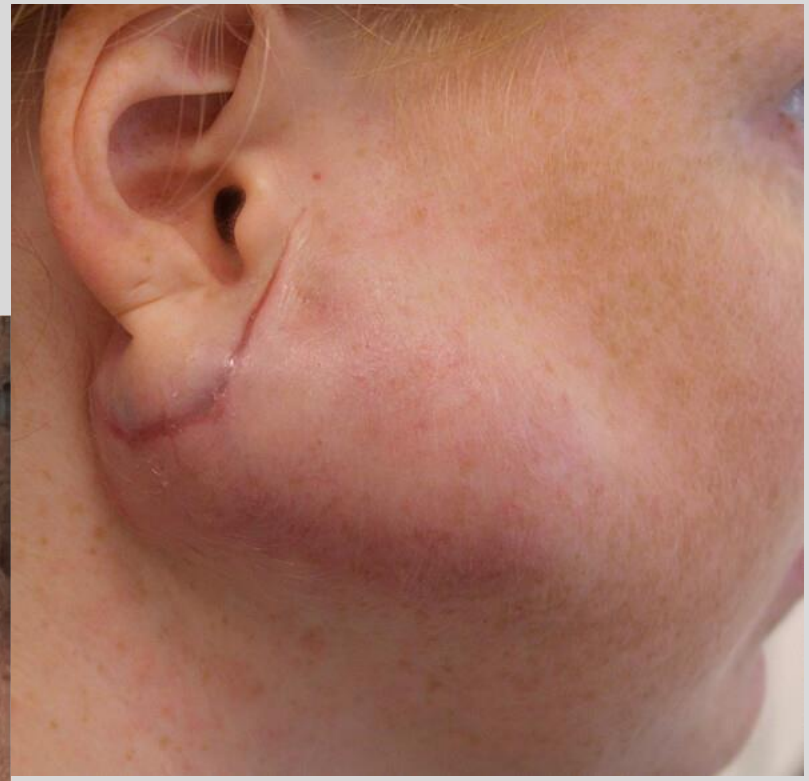
Table 3: University of Pittsburgh Medical Center (UPMC) Staging for JNA

Stage	Description of Tumour Involvement
I	Nasal cavity, medial pterygopalatine fossa
II	Paranasal sinuses, lateral pterygopalatine fossa, no residual vascularity
III	Skull base erosion, orbit, infratemporal fossa, no residual vascularity
IV	Skull base erosion, orbit, infratemporal fossa, with residual vascularity
V	Intracranial extension, residual vascularity Medial (M): Medial cavernous sinus Lateral (L): Middle cranial fossa

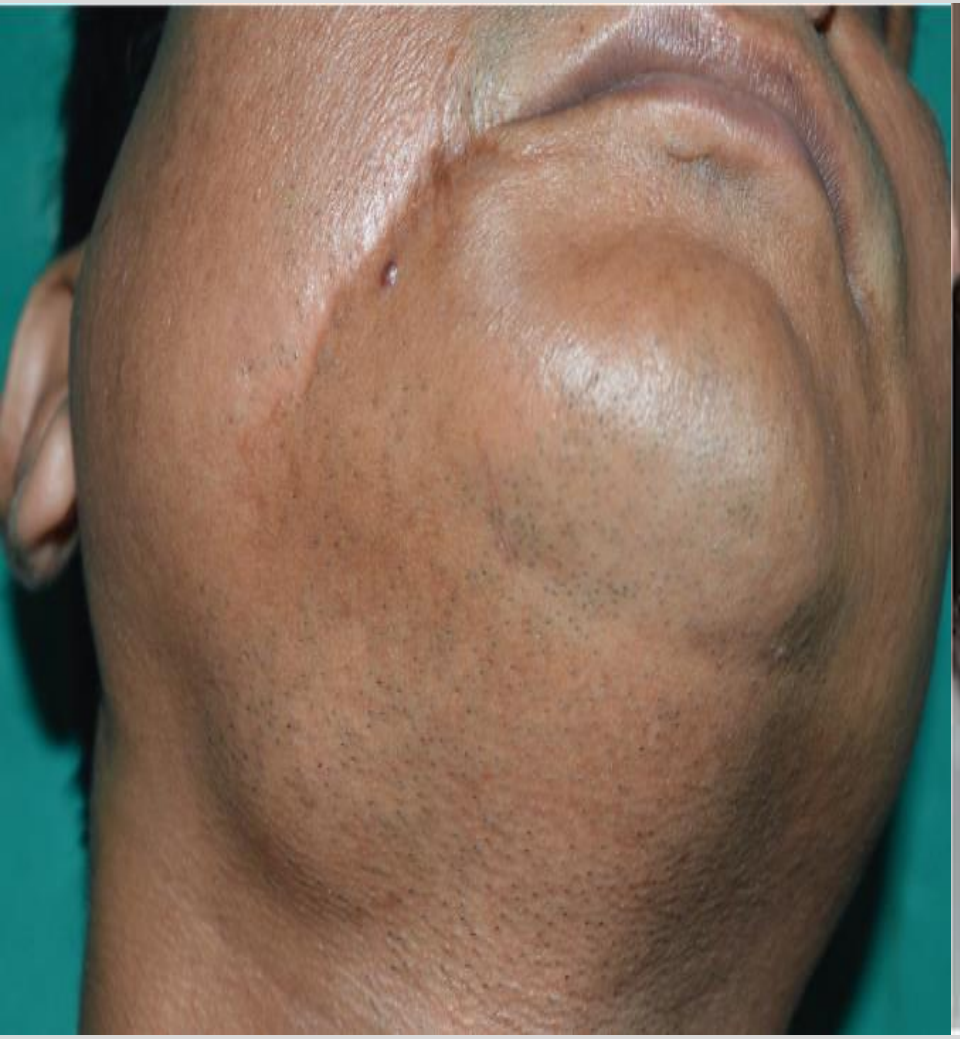
Salivary glands masses parotid

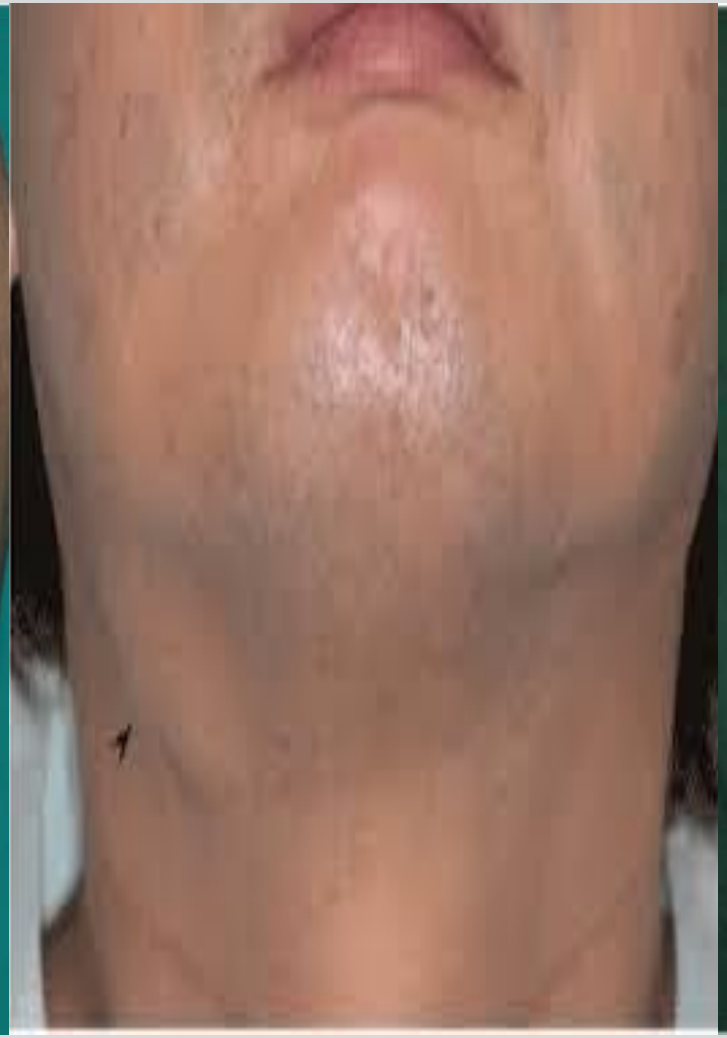


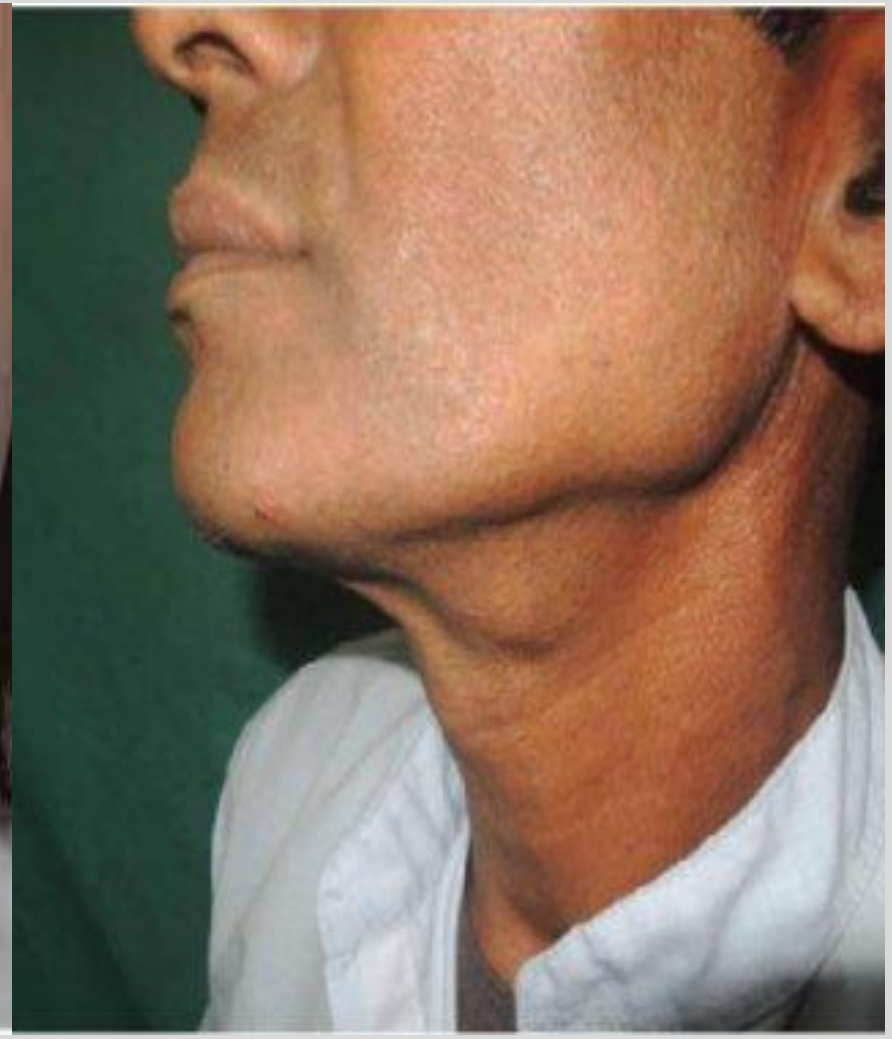




Salivary gland massaes submandibular







Facial nerve

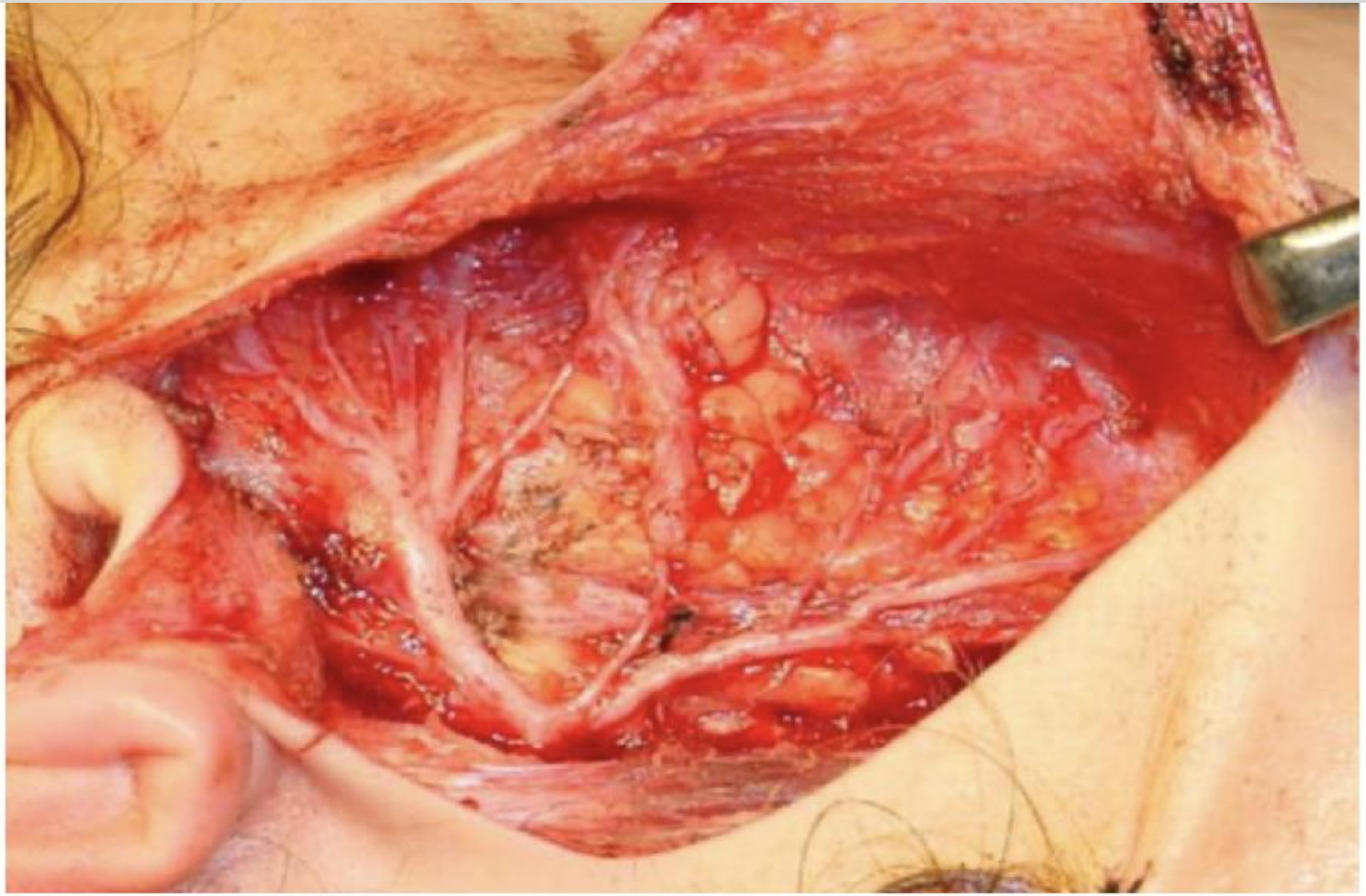


Figure 3: The facial nerve trunk dividing into superior and inferior divisions at the pes anserinus

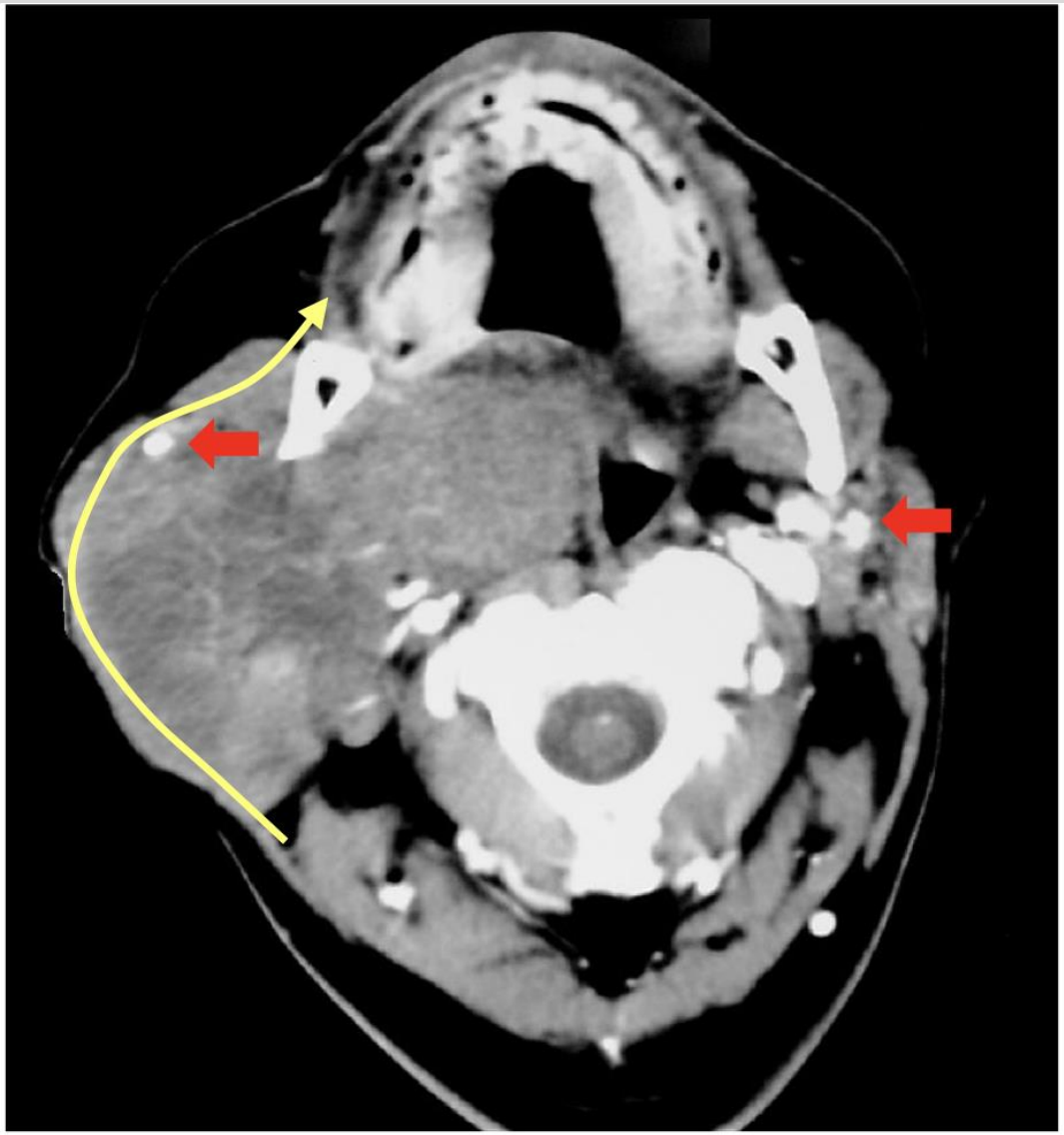


Figure 8: Red arrows indicate retromandibular veins, and yellow arrow the course of the facial nerve in a deep lobe pleomorphic adenoma

NERVE & VEIN

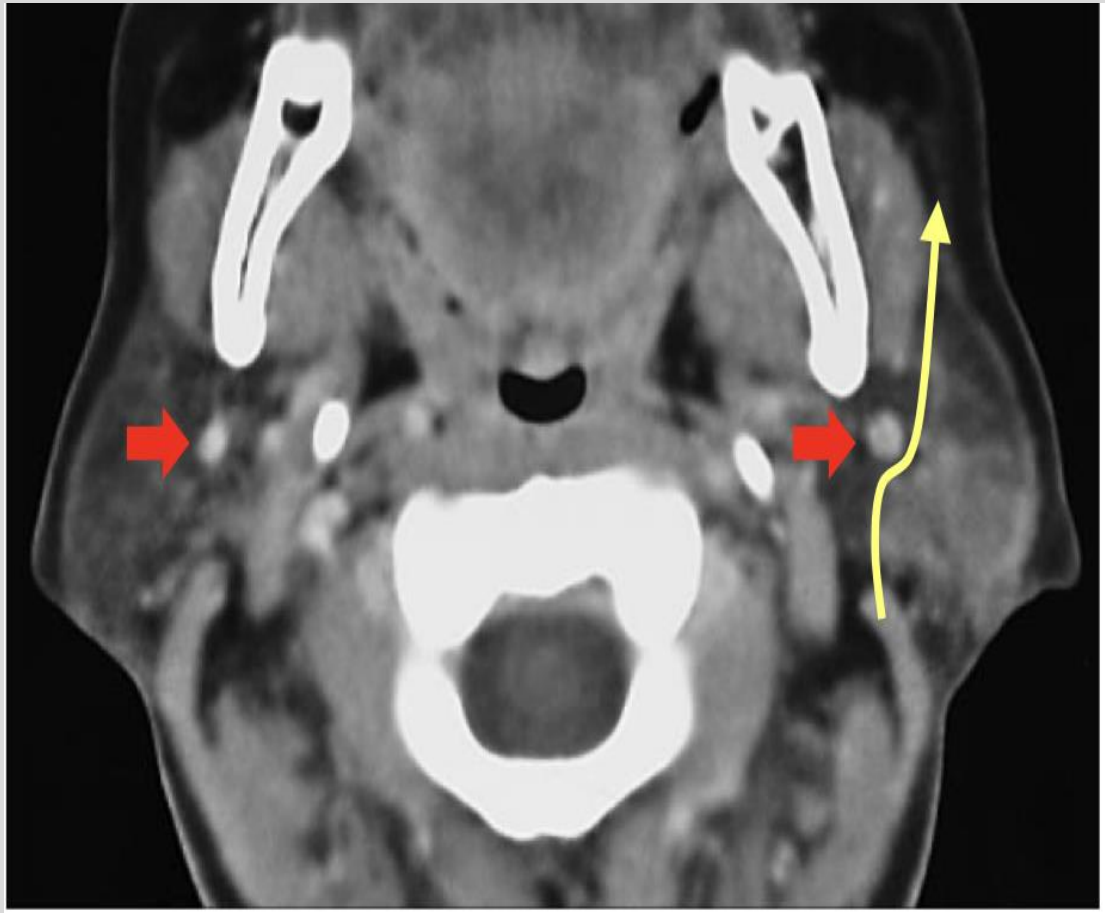


Figure 7: Red arrows indicate retromandibular veins, and yellow arrow the course of the facial nerve in a superficial lobe pleomorphic adenoma

Surgical landmarks for facial nerve

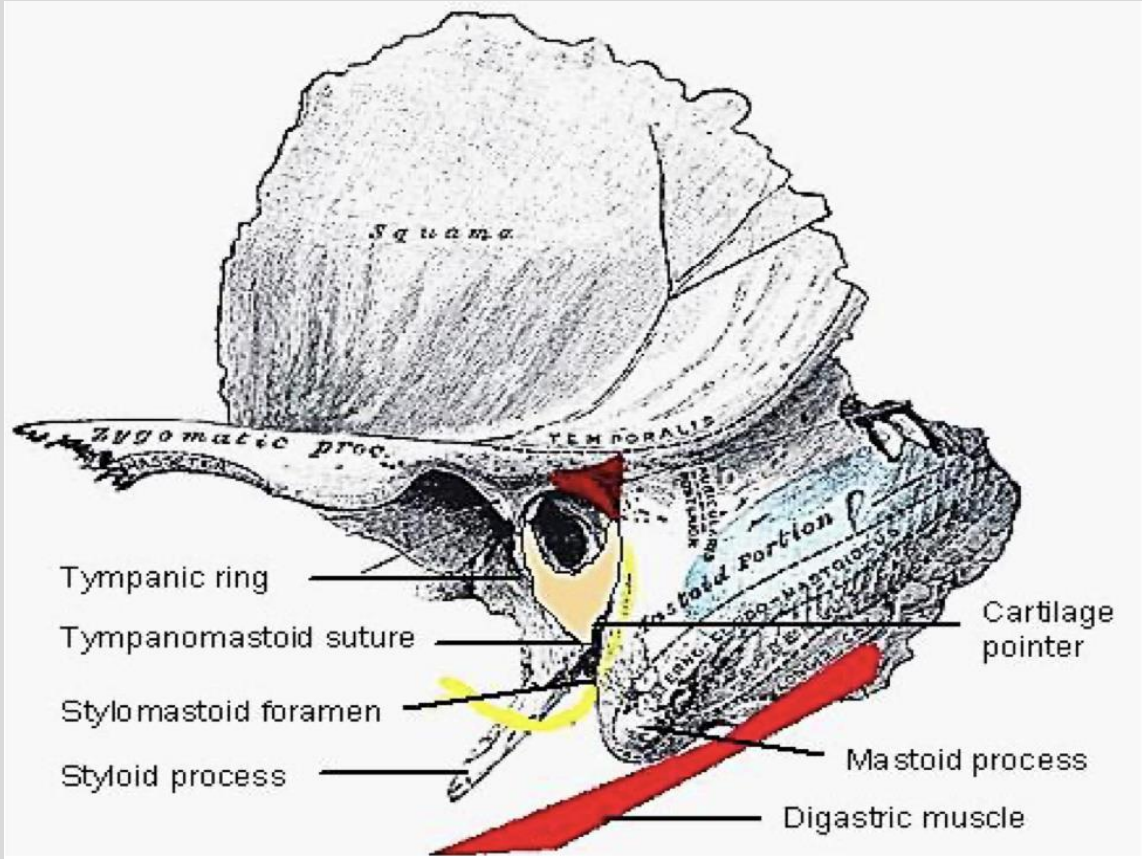


Figure 12: Schematic surgical landmarks for the facial nerve trunk

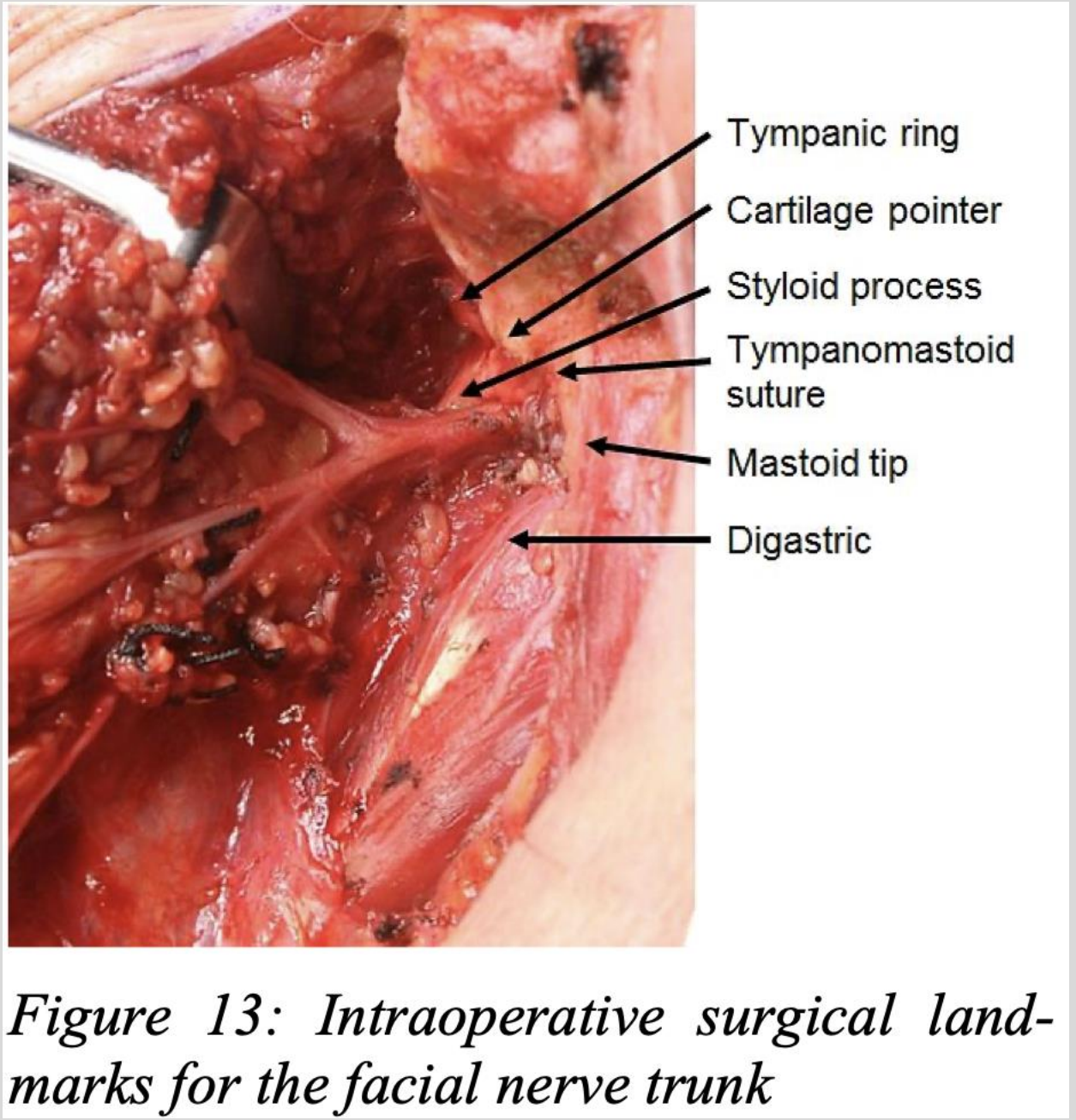


Figure 13: Intraoperative surgical landmarks for the facial nerve trunk

Submandibular gland

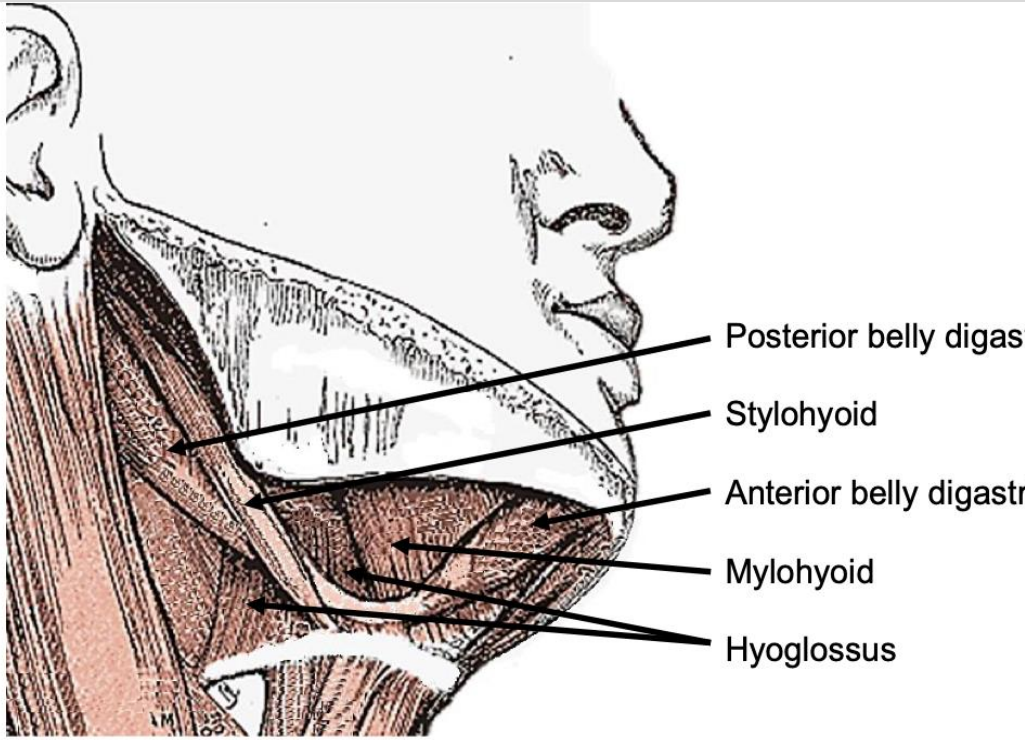


Figure 2: Muscles encountered with SMG excision

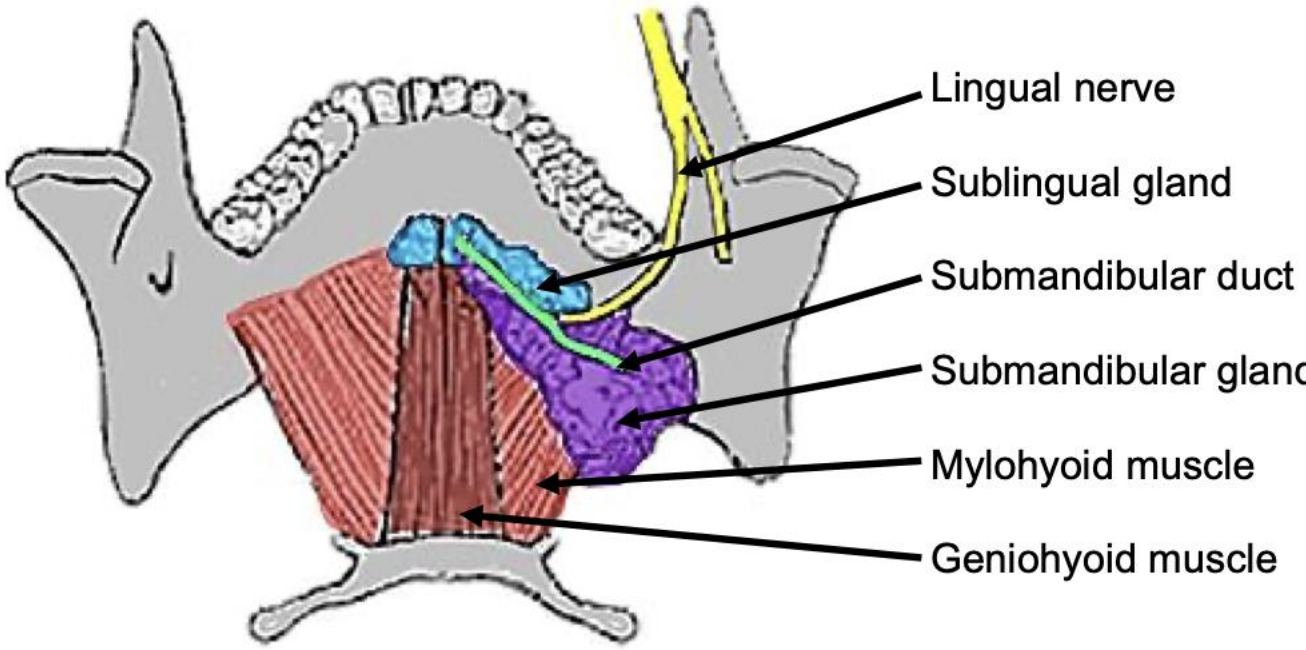


Figure 1: Superior, intraoral view of SMG, duct, lingual nerve and mylohyoid and geniohyoid muscles

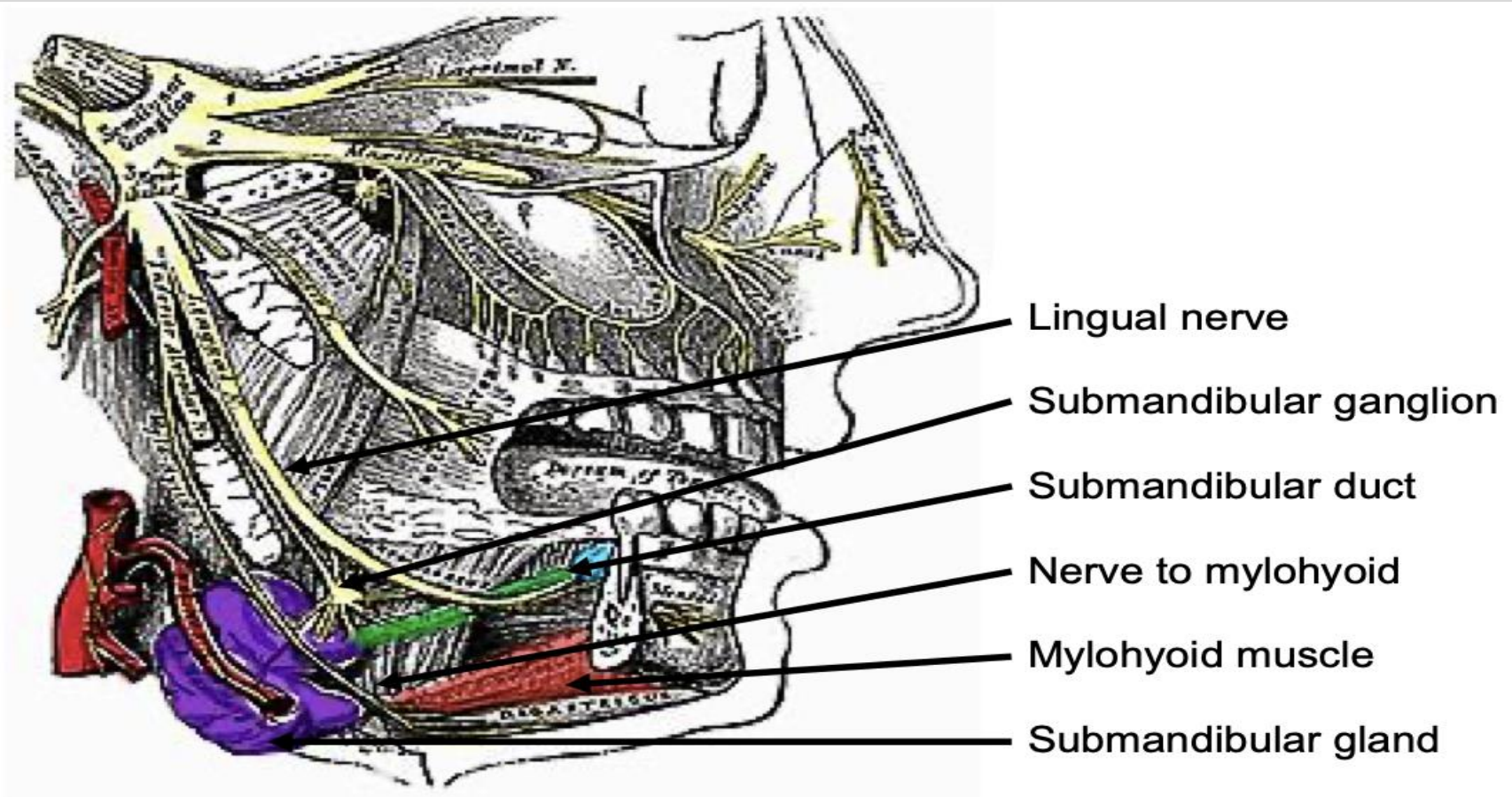


Figure 4: Note the submandibular ganglion, nerve to mylohyoid and how the lingual nerve swerves around the duct

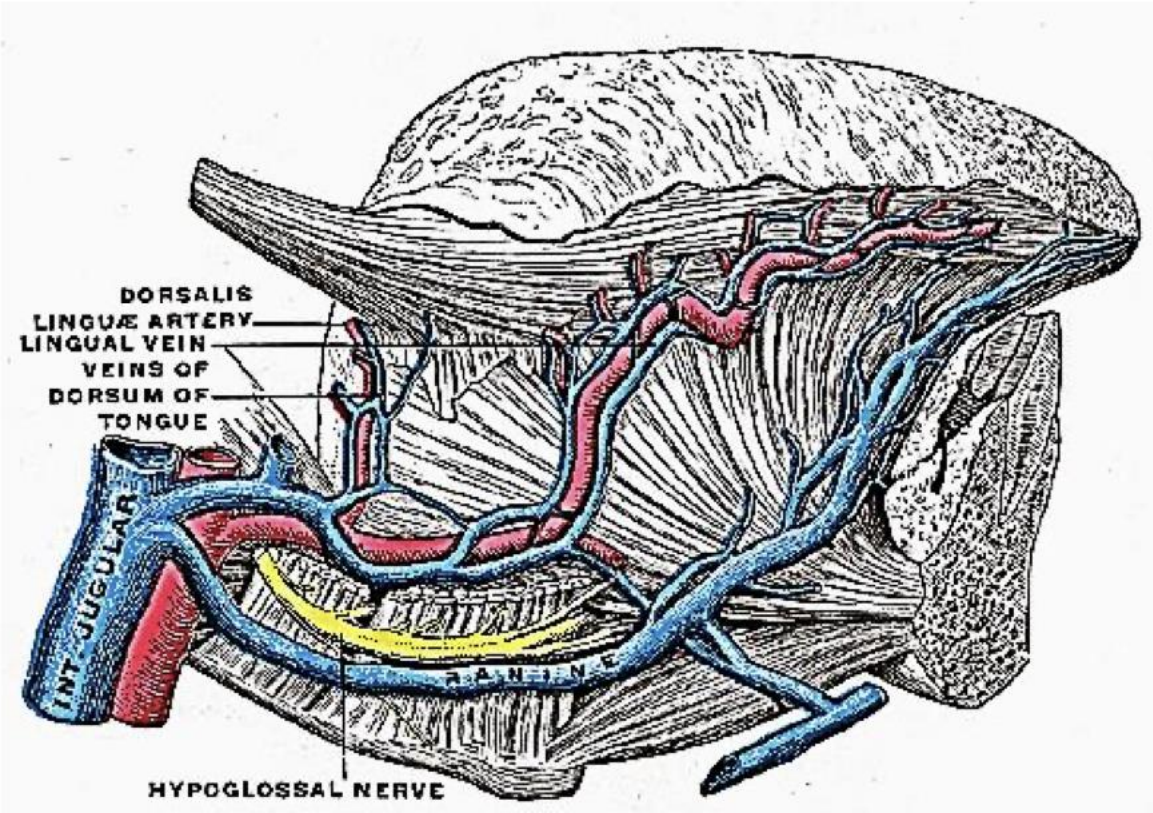


Figure 5: XIIn crossing the hyoglossus muscle, accompanied by ranine veins

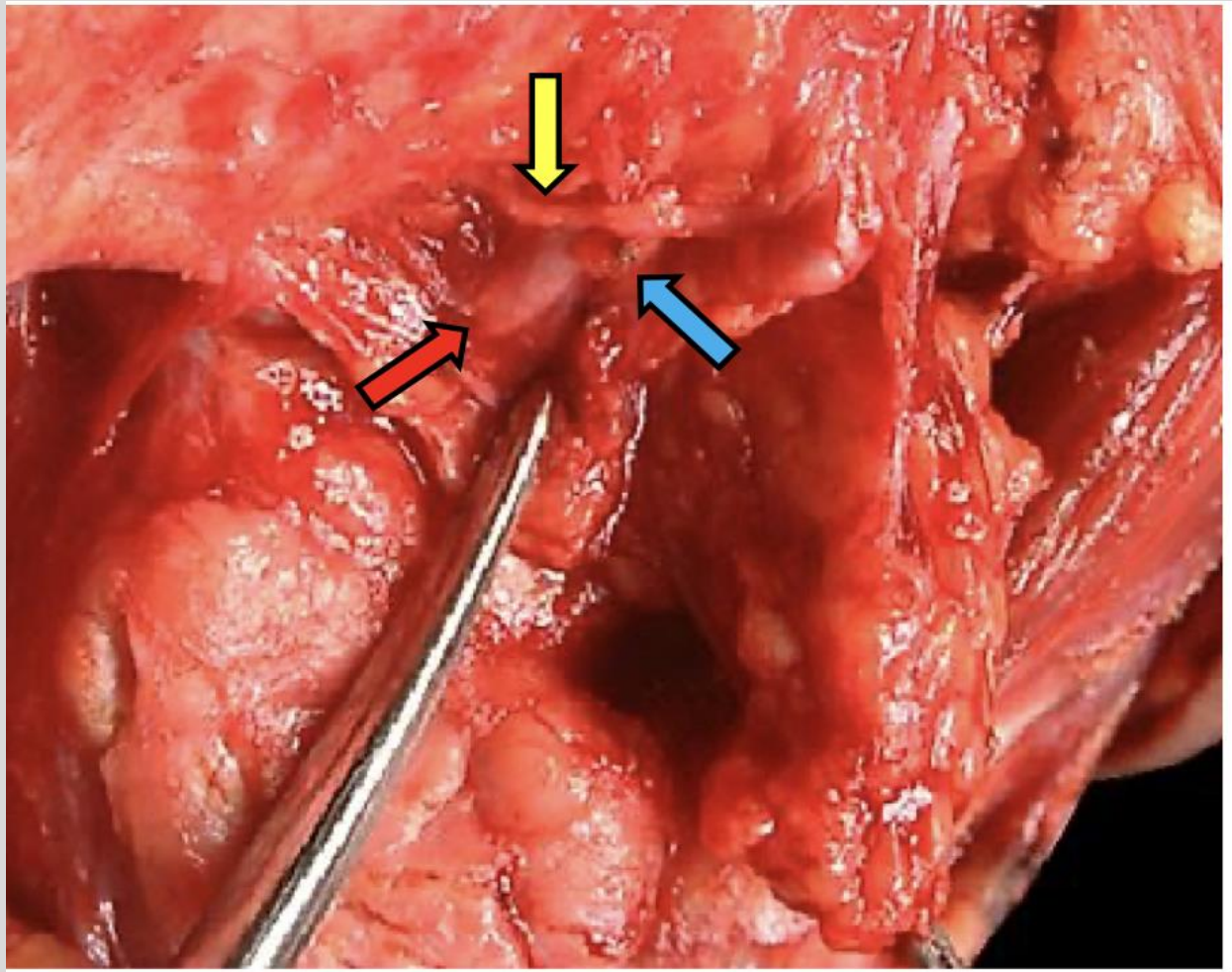


Figure 3: The marginal mandibular nerve (yellow arrow) is seen crossing the facial artery (red arrow) and the ligated vein (blue arrow)

Table 1. Common Salivary Gland Tumors

Benign Tumors	Relative Incidence
Benign mixed	90
Warthin's	8
Oncocytoma	1
Benign lymphoepithelial	1

Malignant Tumors	Relative Incidence
Mucoepidermoid	34
High grade	22
Low grade	12
Adenocarcinoma	33
Adenocystic	11
Acinic cell	5
Miscellaneous	17
Malignant Mixed	20
Squamous cell	8
Cystic papillary	1
Unclassified	4

Table 2. Malignant Salivary Gland Tumors

Mucoepidermoid Tumors	▪ Circumscribed, nonencapsulated lesions arising from salivary duct epithelium ▪ 60-70% located in the parotid; 15-20% in the minor salivary glands (often in the hard and soft palate); 10% in the submaxillary glands ▪ A five-year survival rate approaching 90%.
Malignant Mixed Tumors	▪ Most involve the parotid, fewer the submaxillary gland and minor salivary glands ▪ Probably evolve from benign mixed lesions ▪ An excellent prognosis for focal cancers; poor prognosis in extensive or recurrent cancers
Adenocarcinomas:	
Adenocystic Carcinomas (Cylindromas)	▪ Found in submaxillary and minor salivary glands ▪ Probably originate from canaliculi and intercalated ducts of the peripheral duct systems ▪ Five-year cure rate of 75%; 10- to 20-year cure rate drops to 15-20%
Acinic Cell Carcinomas	▪ Peculiar to the parotid (rarely occur in submaxillary and minor salivary glands) ▪ 70% occur in women ▪ Five-year cure rate of 90%; 25-year cure rate of 50%

Table 3 - Differential diagnosis of parotid space lesions.

Pseudotumor:	• Masseter hypertrophy • Accessory parotid gland
Inflamatory lesions:	• Parotitis or parotid gland abscess • Reactive adenopathy • Sjogren's syndrome
Cystic lesions:	• First branchial cleft cyst • Benign lymphoepithelial cyst (AIDS) • Lymphangioma (children)
Benign tumors:	• Hemangioma (children) • Pleomorphic adenoma • Warthin's tumor • Facial nerve neuroma
Malignant tumors:	• Mucoepidermoid carcinoma • Adenoid cystic carcinoma • Adenocarcinoma • Non-Hodgkin's lymphoma - primary and metastatic • Lymph node metastases from SCCa, skin, breast or lung cancers • Perineural tumor spread along facial nerve

Salivary Gland	Malignancy Rate	Incidence of Tumor
Parotid	20%	80%
Submandibular	50%	15%
Sublingual & Minor	70%	5%

Table 4. Indications for Referral in Patients with Suspected Salivary Gland Malignancy

Complications from infection (e.g., abscess, fistula, cranial nerve deficit)
Recurrent or chronic symptoms
Suspected neoplasm for biopsy and removal
Suspected salivary stone
Swelling or infection unresponsive to medical care

Table I. Criteria used in the definition of viral mumps cases by the National Epidemiological Surveillance Network

Clinical criteria: person with fever and at least one of the following two manifestations:

- Sudden onset of swelling, painful to the touch, of the parotid or other salivary glands
- Orchitis

Laboratory criteria: at least one of the following:

- Mumps virus-specific antibody response (IgM or IgG seroconversion) in serum or saliva
- Detection of mumps virus nucleic acid by PCR in saliva, urine or cerebrospinal fluid
- Isolation of mumps virus from saliva, urine, or cerebrospinal fluid

Epidemiological criteria: contact with a laboratory-confirmed case of mumps between 14-25 days before the onset of symptoms

Salivary gland complaint	Cause
Acute intermittent generalized swelling	Obstructive disorders including: Sialolithiasis – salivary stones Stricture or stenosis of the duct, usually secondary to surgery, stones or infection Recurrent parotitis of childhood
Acute generalized swelling	Infection, either: Viral, e.g. mumps Bacterial-ascending sialadenitis
Chronic generalized swelling	Sjögren's syndrome, either primary or secondary Sialosis Chronic infection HIV disease Cystic fibrosis Sarcoidosis
Discrete swelling	Intrinsic tumour, benign or malignant Extrinsic tumour Cysts Overlying lymph nodes
Dry mouth	Sjögren's syndrome Post-radiation damage Mouth breathing Dehydration Functional disorders, including: Drugs, such as tricyclic antidepressants Neuroses, particularly chronic anxiety states
Excess salivation	Psychological (false ptyalism) Reflex, e.g. due to local stimulation Heavy metal poisoning

Table 1. Salivary Gland Disorders

Condition	*Etiology*	*Clinical presentation*	*Diagnosis*	*Treatment*
Acute suppurative sialadenitis	Bacterial infection	Sudden onset of pain and swelling	Swollen, indurated, tender gland; purulence from duct may be seen	Antibiotics, gland massage, hydration, sialagogues, warm compresses, oral hygiene
Chronic or recurrent sialadenitis	Obstruction (stone or stricture) of the duct	Repeated episodes of pain and swelling, often with meals; recurrent infections	Swollen or firm gland; may appear normal on examination; imaging (computed tomography or ultrasonography) may show calculus or dilated duct	Hydration, gland massage, sialendoscopy or open surgery
Neoplasm	May be benign or malignant	Painless, firm, slow-growing mass	Imaging (computed tomography or magnetic resonance imaging); fine-needle aspiration	Surgical removal of gland
Recurrent parotitis of childhood	Unknown	Repeated episodes of pain and swelling of the parotid gland in children	Clinical history; examination and imaging findings are usually normal; parotid gland may be swollen	Antibiotics, gland massage, hydration, sialendoscopy
Viral infections	Most commonly mumps or human immunodeficiency virus	Swelling, often bilateral; may be tender	Viral serology	Supportive care; antiretrovirals for human immunodeficiency virus infection


THE END